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THE AMERICAN REVIEW

ARMS CONTROL: ISSUES AND [illegible]

HARVARD NUCLEAR GROUP
The Realities of Arms Control

ANDREI SAKHAROV
The Danger of Thermonuclear War

ROBERT JASTROW
Why Strategic Superiority Matters

[illegible]
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A NOTE TO THE READER

NUCLEAR weapons exist. Given the political realities of today, they cannot be eliminated—totally. However, it is possible to reduce—perhaps even neutralize—the danger of nuclear weapons.

The exit route to safety, it seems, lies in the successful pursuit of arms control agreements. Precisely because of this, arms control has been the subject of intense public debate in recent years throughout the world. Our *special section* in this issue continues this lively debate in four stimulating essays written by a team of nuclear experts and three distinguished authors.

"The Realities of Arms Control," culled from the Harvard Nuclear Study Group's exhaustive report on arms control entitled, *Living With Nuclear Weapons,* concludes that "arms control must be accompanied by some improvement in U.S.-Soviet relations if humanity is to cope with its nuclear predicament." In his *open letter* to Dr. Sidney Drell, which forms the text of his essay, "The Danger of Thermonuclear War," the distinguished Soviet physicist, Andrei Sakharov, stresses the importance of "strategic parity of nuclear forces" to ensure safety. Robert Jastrow's "Why Strategic Superiority Matters" examines the issue of strategic superiority in the historical context, with a cautionary reflection on Senator Moynihan's thought that "he who can blow the world up three times has more power than he who can blow it up only twice." Nils H. Wessell' essay, "Soviet-American Arms Control Negotiations," analyzes the initiatives and efforts hitherto undertaken by the two nuclear giants toward reaching some positive agreements on the arms control issue.

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Two essays in our *review* section give a glimpse of the current intellectual thinking in America on the nuclear issue. Bernard Malamud's evocative novel, *God's Grace,* is set against the backdrop of a new world, after a thermonuclear war destroys the world we now live in. Thomas J. Bray, in "Perspectives on the Nuclear Know-Nothings," reviews three recent books on the subject: *Living With Nuclear Weapons* by the Harvard Nuclear Study Group (a short version of which appears in the *special section* of this issue); *The Wizards of Armageddon* by Fred Kaplan; and *The Truth About the Neutron Bomb* by Sam Cohen, the man who invented the neutron bomb.

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—O.G.

The Realities of Arms Control

By THE HARVARD NUCLEAR STUDY GROUP

"Arms control alone," reports the Harvard Nuclear Study Group, "is not enough.... The ultimate hope for peace and security lies with improving international relations to the point at which conflict does not threaten to erupt into war, and reconciliation replaces aggression. Whether the world eventually reaches this goal or not may depend on the combination of arms control with effective deterrence over the next decades." The Harvard Nuclear Study Group is made up of Albert Carnesale, academic dean of the Kennedy School of Government; Paul Doty, director of the Center for Science and International Affairs; Stanley Hoffmann, chairman of the Center for European Studies; Samuel P. Huntington, director of the Center for International Affairs; Joseph S. Nye, Jr., professor of government; and Scott D. Sagan, a teaching fellow in the Department of Government. The Group's complete report, *Living With Nuclear Weapons,* has just been published by the Harvard University Press and Bantam Books.

IN an imperfect world, few people have been willing to adopt pure pacifism, which means the refusal to defend one's self, family, country, or allies from any kind of attack. Those who are not pacifists must wrestle with many difficult choices about weapons, their existence, and their potential use. This has always been true. Warfare is as old as human history, and disarmament as a prescription for avoiding it dates back at least to biblical times. Though the implementation of disarmament has been rare, its basic premise—that war is not possible without weapons—is both simple and appealing.

Regrettably, the premise is flawed. The supply of weapons is not the sole or even the prime cause of war. Disarmament may remove the most destructive weapons, but others will be found.

One reason successful disarmament efforts are rare is that they require a degree of political accommodation that is difficult to achieve. Unless some political trust exists, efforts to disarm prove fruitless. But political accommodation and trust are built slowly, so complete disarmament—as contrasted with limited arms control—is a long-term rather than an immediate prospect.

Complete disarmament would require some form of world government that would deter actions of one nation against another. In a disarmed world,

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without such a government armed with sufficient force to prevent conflict between nations, differences in beliefs and interests might easily lead to renewed conflict and the threat of war. But any world government capable of preventing world conflict could also become a world dictatorship. Given the differences in ideology, wealth, and nationalism that now exist in the world, most states are not likely to accept a centralized government unless they feel sure of controlling it or minimizing its intrusiveness. A weak central machinery would be ineffective. And even a strong one—assuming that governments would agree to set it up—could still be faced with breakdown. If breakdown occurred, individual nations would rearm, and those who were able would race to make nuclear arms.

Complete disarmament would be a leap into the unknown; each state would accept disarmament only if the dangers it feared could be ended or if it thought that the danger of nuclear holocaust outweighed the risks involved in nuclear disarmament. Despite the present costs of national military forces and arms competition, despite the limited gains that the threat to use weapons now brings, and despite the enormous risks such uses may entail, nations with nuclear weapons still see a clear national advantage in keeping them. They are thought to provide the possibility of deterring aggression and of projecting political influence. Disarmament would not necessarily ensure a state's position in the international contest between states. It would not necessarily ensure a state's security. Nor would it guarantee that the funds saved from weapons would necessarily be devoted to raising the living standards of poor peoples. For these reasons, governments have preferred a combination of arms, self-restraint, and arms control to complete disarmament.

While complete disarmament may be a worthy long-term goal, trying to achieve it before the requisite political conditions exist could increase the prospects of war. If the political preconditions of trust and consensus are missing, complete disarmament is inherently unstable. In a disarmed world, the first nation to acquire a few arms would be able to influence events to a much greater extent than it could in a heavily armed world. Nuclear weapons greatly magnify this danger. Moreover, nuclear weapons can be easily hidden or quickly reinvented. When many nuclear weapons exist, a few hidden bombs do not matter. But in a disarmed world, if political mistrust persists, rumors of hidden bombs or fears of their reinvention by any number of nations could lead to the worst kind of nuclear arms race—a crash program, in which weapons would be built without the safety features of existing weapons.

Nuclear-arms races do not guarantee peace and security either, of course. Instead, they can guarantee enormous destruction if war occurs either by design or, more likely, through accident, miscalculation, or misunderstanding. With no safe port in complete nuclear disarmament or in unrestricted competition, mankind has been compelled to seek safety by using arms control to lower the risks that nuclear weapons impose on peace and security.

"Arms control" has to a large extent replaced "disarmament" in the specialist's vocabulary since about 1960, but as long as disarmament is not taken to mean complete disarmament, the terms overlap. Arms control includes a wider range of actions than the removal of arms. It includes steps that improve stability and help avoid accidents. Some arms-control agreements reduce armaments, but not all do.

A common criticism of arms-control advocates is that they mistake the symptoms for the disease: since the origins of conflict are not in the existence of weapons, the cure should not be sought in their restraint. But the easy recourse to weapons in times of stress or panic does increase the likelihood of their use. Arms control alone, then, is not enough. It is also important to attack the sources of conflicts. The ultimate hope for peace clearly lies with improving international relations to the point at which conflict does not threaten to erupt into war, and reconciliation replaces aggression. Whether the world eventually reaches this goal or not may depend on the combination of arms control with effective deterrence over the next decades.

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During the past three decades, the military establishments of the United States and the Soviet Union have become the most powerful and most expensive institutions ever created. Such enormous bureaucracies naturally resist the changes that arms-control initiatives attempt to introduce. On the American side, the annual budget for the Arms Control and Disarmament Agency is lower than the cost of two F-16 fighter aircraft. Ideally, arms control and security policy should go hand in hand. But many arms-control initiatives do not survive the raised eyebrows of the defense community, and defense decisions may be made without regard for their arms-control implications.

This bureaucratic imbalance would ordinarily suppress most arms-control initiatives were it not for heads of governments, who have been chiefly responsible for any arms-control initiatives. Arms control, then, is precarious, and vulnerable to the changing views of successive Administrations; nevertheless, at least in democracies, polls show a continual public support for efforts at arms control. Presidents ignore these efforts at their own political peril.

Another difficulty encountered by those who advocate arms control is the unusual U.S. constitutional clause on the ratification of treaties. The United States alone among industrialized Western countries requires a two-thirds majority in the Senate to ratify treaties. This means that a minority, one that often represents much less than one-third of U.S. voters and is motivated by diverse interests, can block ratification. The role of arms control would have been much greater in the past decade if ratification required only a majority vote.

On the Soviet side, arms-control negotiations have been a constant ingredient of relations with America for a quarter of a century. Not only do they make for diminished risks and greater effectiveness in both sides' military planning, they have helped establish the Soviet Union's claim to co-equal status with the United States. As might be expected in a country that has steadily increased its military spending for two decades and whose defense programs are insulated from fluctuating public attitudes, Soviet arms-control policy has been tightly integrated with Soviet military policy.

Until about 1960, the Soviet Union was in such an inferior position strategically that it resisted Western arms-control initiatives for the understandable reason that agreements would have frozen it in perpetual inferiority. However, it camouflaged this position by campaigns for general and complete disarmament and offers to ban weapons first and work out verification later. Nevertheless, from 1959 through the 1960s, a number of limited agreements were negotiated that prohibited nuclear deployments in Antarctica, space, and the seabed; banned nuclear tests in the atmosphere; and created the Non-Proliferation Treaty. With the approach to parity in the 1970s, it became possible to open up negotiations in the domain of central strategic forces.

The approach of the Soviet Union was limited by its concept of deterrence, which emphasizes that whoever can deliver the greatest blow first is more likely to remain dominant. This explains the Soviet preoccupation with land-based, highly-controlled, large ICBMs—inter-continental ballistic missiles. A main Soviet arms-control objective has been to retain ICBM forces and to ensure their modernization. The Soviets have resisted American efforts to use arms control to encourage greater Soviet reliance on their submarines, which they have regarded as an area of American advantage. At the same time, they have accepted a number of measures that do not reduce their own central forces, such as a series of bans and limitations on new weapons or weapons in the planning stage. The successful treaty limiting anti-ballistic-missile defenses was one of this sort.

Another preoccupation of the Soviets has been with what they call "equal security," which, they have argued, requires more than an equal number of weapons. They use the term to justify claims of compensation necessary for geographical handicaps, for American nuclear weapons assigned to NATO, and for British, French, and Chinese nuclear weapons. They are not receptive to U.S. claims that they have an advantage because of their proximity to Europe. Their demand for equal security has complicated efforts to negotiate reductions that maintain rough parity.

The Soviets, like the Americans, often use arms-control proposals as propaganda—but much more easily than Americans can, because there is no effective public opinion in the Soviet Union. The extent to which the Soviet Union publicizes its role in negotiations seems to tell something about the seriousness with which it wants a compromise agreement. The negotiations of SALT I and SALT II were generally carried out with considerable privacy until the late stages. The same pattern apparently is being followed in START (Strategic Arms Reduction Talks) as well. However, the INF (intermediate nuclear force) negotiations have been carried out in public view almost from the beginning. One of the Soviet objectives in these negotiations is to split Western Europe from the United States and thereby halt or limit the deployment of intermediate-range forces. If this tactic fails, an INF agreement may be possible.

The START proposals of the Reagan Administration would cut deeply into Soviet land-based forces, which have been sacrosanct in the past. The "deep cuts" approach runs counter to the Soviet penchant and tradition for small increments of change. In a period of political transition, Soviet leaders often find it especially hard to move in radical directions. The new Soviet leader, Yuri Andropov, is a product of this system and is beholden to military support in attaining his office. Not surprisingly, the Soviets have offered proposals only for modest reductions and restrictions on new systems of interest to the U.S.

Andropov came into office last November at the age of 68. With only a few years to leave his mark, he may wish to move faster in arms-control negotiations. More important, he faces serious political and economic problems: a decreasing Soviet work force; minority pressures for larger roles; a chronically incompetent agricultural system; inadequate consumer-goods production; unrest in Eastern Europe; and, most of all, a shrinking economic growth rate that does not provide the base it once did for the Soviet military machine. Together, these pressures may induce a more active search for maintaining the military competition with the West at lower levels of risk and expenditure.

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Given the distrust between East and West, only arms-control agreements that are verifiable are likely to be negotiated and ratified. In the 1950s, the West routinely proposed, and the Soviet Union routinely rejected, measures to monitor arms-control and disarmament agreements that involved on-site inspection—that is, provision for the physical inspection of a country's weapons and facilities by foreign experts. During the next 20 years, however, both sides developed complex verification technology—most important, photo-reconnaissance satellites.

It was the revolution in verification technology in the 1960s that made possible the more ambitious efforts of SALT. Of necessity, the SALT process reflected the limitations of verification technology. Only delivery vehicles that were large enough to be seen from space (for example, ICBM launchers) or that, if mobile, could operate only from relatively few, known bases (heavy bombers and strategic submarines) could be verified. It was possible, however, to set limits on warheads and bombs, which were too small to be verified directly, by agreeing to somewhat arbitrary counting rules. Each type of missile, for example, was counted as having the maximum number of warheads ever tested on it, rather than the actual number deployed, which might be much less.

While the Soviets have elaborate surveillance equipment, they have less interest in verification than the United States, because of the very different nature of the two societies. The high level of reporting about American defense plans—from Congressional hearings, media coverage, and leaks from officials—makes it likely that any American violation of an agreement will be publicized. This makes verification much easier for the Soviet Union. Exacting verification procedures are seen by the Soviets as something they "give" to the United States, for which they often want something in return. At the same time, the Soviets are extremely secretive about military matters, a tradition with deep roots in the history of their country, which has been invaded frequently. Many of the verification measures proposed by the U.S. look like espionage measures to the Soviets. Over the years, negotiations have helped convince the Soviets that such procedures are not a cover for espionage but an essential requirement for ratifiable arms-control measures. Yet in each instance, procedures must be justified in minute detail and negotiated in ways that minimize intrusiveness.

It should be remembered that the vast system of monitoring and intelligence collection that the United States must use for verification is needed whether arms-control agreements exist or not. Arms-control agreements, especially SALT II, have greatly increased our knowledge of the Soviet nuclear arsenal; both sides have promised not to interfere with each other's surveillance devices, and both have agreed that certain activities will not be concealed but will remain open to monitoring. The verification in future agreements will thus have a broader foundation on which to build. Moreover, improvements in verification technology continue, and it is reasonable to expect that capabilities that were not possible in the past will exist in the future.

When matters of national security are at stake, both the government and the public wish to know for certain whether agreements are being kept. But in daily life, we know that we must live with some uncertainty. Verification of arms-control agreements is no different; some risks are inevitable. But an unrestrained arms race also creates risks. Risks must be balanced and judgments made about the adequacy of verification, which must enable us to detect any Soviet violation large enough to threaten our security in time for us to be able to make a sufficient response. If there were deep reductions in numbers, minor violations might be more dangerous than is the case with current high levels of weaponry.

Much of the U.S. internal debate during the SALT II negotiations and ratification hearings focused on such problems. Although the verification of some treaty provisions was seen to be less adequate than that of others, the trade-offs made between uncertainty and the importance of the item to be limited were generally agreed to be prudent.

The new weaponry scheduled for deployment in this decade raises new problems. Cruise missiles will present a special challenge to verification. They are small and can be easily changed from conventional to nuclear warheads. The focus may have to be on restricting the ships and planes that carry cruise missiles and the regions of their deployment. Close monitoring of both sides' production plants may also help. Two difficult judgments will have to be made: what kinds of violations have significant adverse consequences on American security, and what is the probability that such violations could be detected? If one insists on absolute certainty in verification, then very little can be verified and arms cannot be controlled. On the other hand, if verification procedures are absent or lax, cheating may occur and confidence in the other side's compliance will be lost. The task is to find the right middle ground.

Verification procedures in future agreements will be subject to even greater scrutiny, for two reasons. First, the Soviet Union refused to cooperate with American efforts to discover whether an outbreak of anthrax in a Soviet city was a violation of the Biological Weapons Convention of 1972. Second, there is increasing evidence of the use of poison gas by the Soviet forces in Afghanistan and the use of toxins by the military forces they support in Cambodia. Neither the Geneva Protocol of 1925 nor the 1972 convention has the elaborate verification provisions and procedures that the SALT treaties have. These presumed Soviet actions have reinforced the importance of having such provisions in any future arms-control agreements.

Despite all of these difficulties, however, over the past 25 years there has been a gradual improvement in Soviet willingness to provide information, to negotiate details of on-site inspections—for example, in the 1974 Threshold Test Ban Treaty—and to engage in the discussion of verification requirements. It has been a slow process, but it should not go unnoticed.

Although no arms-control treaties of significance have been ratified during the past decade, the numerical growth of nuclear forces has been somewhat restrained compared with what it might have been, because of limits in the SALT II agreement (even though it was not ratified) and the retirement of aging weapons. From 1978 to 1982, the number of strategic launchers actually decreased by about 1 percent for the Soviet Union and about 9 percent for the U.S. The total number of warheads and bombs deployed by the U.S. remained essentially constant during that period. The Soviet Union, completing its MIRV (multiple independently-targeted reentry vehicles) programs, did, however, increase its strategic warhead total by 60 percent, reducing the U.S. lead in that category.

The arms race in recent years has been not in numbers of weapons but in technological improvements. Both sides, for example, have greatly improved the accuracy of their forces. More improvements are to come. If new arms-control restraints are not negotiated, the next few years will see new weaponry incorporating even more remarkable technological changes: the building and testing of new bombers, new ICBMs, and new SLBMs (sea-launched ballistic missiles); the deployment of new cruise missiles on bombers, trucks, ships, and submarines; the attainment of absolute accuracy; and the development of anti-satellite weapons. Although many of these are planned replacements, there could be an increase of about 25 percent in numbers of weapons by 1990 if no agreements are reached.

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Arms-control proposals can be judged by whether they contribute to three dimensions of stability. The first is deterrence stability—assuring that our forces are capable and credible enough to deter the Soviet Union from political adventures that could lead to war through miscalculation. The second is arms-race stability—controlling the weapons buildup in the two countries so that the military relationship is more predictable and resources can be used for purposes other than weaponry. The third is crisis stability—creating forces of a type that provide no incentive for either side to launch a first strike in a time of crisis. In addition to these central criteria, arms-control proposals can be judged in terms of negotiability and possible verification.

People frequently think of arms control simply as formal treaties for reducing existing weapons. But bargaining and agreements can be informal as well as formal, and agreements can affect future types of forces even if they do not reduce existing forces. Some arms-control measures may be designed to build confidence or stability through improved communications rather than changes in forces. The range of possibilities for arms control can be usefully grouped under four headings, and some components from different approaches can be combined in interesting and complex proposals. At the risk of oversimplification, the four main categories are reductions, freezes, force restructuring, and stabilizing measures.

Reductions in the number of existing weapons are probably the most common measure by which the public judges arms control. They address the view, shared by many experts, that the nuclear arsenals of both sides have grown irresponsibly large, and that a much smaller nuclear force would be adequate and cheaper. An abundance of weapons, some argue, encourages further planning for nuclear war-fighting, which leads to demands for even more weapons.

Reductions are, however, not as simple as they first look. The wrong kind of reductions could increase, not lessen, instability. For example, if single-warhead missiles were reduced instead of MIRVed missiles—which may happen, because MIRVed missiles are newer and more powerful than single-warhead missiles—fears of preemption would increase. That is so because each of the many warheads on a MIRVed missile threatens an entire missile on the other side. Imagine that each side had only 100 missiles, all of them MIRVed. An aggressor might be tempted to strike first because it could reasonably hope to knock out many of the other side's missiles with just a few of its own, secure in the knowledge that it would still have a large retaliatory force. But if each side had only 100 *single*-warhead missiles, an aggressor would have to fire all of its missiles to hope to knock out the other side's force; and it would know that anything less than complete (and unlikely) success would leave it open to unanswerable retaliation. This example is entirely theoretical, of course, because it leaves out nuclear submarines and bombers, but it does illustrate why MIRVed missiles are thought to be destabilizing.

Certain types of proportional cuts, such as cutting all existing categories by 50 percent, could also be destabilizing. It might be dangerous, for example, to cut in half the number of strategic submarines. Because we keep half of our nuclear submarines in port, fewer than 10 submarines would then have to be tracked and destroyed for a successful surprise attack against what is now the most invulnerable part of our force.

Another problem arises because the forces on the two sides differ so much that each side prefers reductions in different areas. Each side urges reduction schemes that remove the weapons it most fears on the other side but that permit retention of its own preferred weapons. Disagreements over what is to be reduced take up much negotiation time. Treated wisely, however, asymmetries can become the means of agreeing on important trade-offs that have to be made if negotiations are to succeed.

Another problem with the deep-reductions approach is focus: if all efforts were concentrated on such reductions, would other aspects of arms control be neglected? The danger is that the search for the perfect becomes the enemy of the good. All arms control might be stalled or discredited.

This problem can be seen in both the Soviet and the U.S. opening position at the START negotiations. There are clear benefits in the reductions described in both proposals. The U.S. proposals attempt to alter the balance within the Soviet forces of land-based and sea-based missiles. These proposals are made in the interest of improved stability, but they require changes the Soviet Union is unlikely to make unless it is compensated by substantial gains elsewhere in the treaty. The U.S. proposal to postpone restrictions on bombers and cruise missiles, where much of the U.S. growth will take place, is also unlikely to be attractive to the Soviets, who propose severe restrictions only on areas of American advantage: cruise-missile deployments, new bombers, and new submarines. An agreement will not be easy. Still, there may be enough common interests to make a compromise possible.

Two new features are coming into prominence in negotiating reductions in missiles: rapid reload and mobility. Launchers for some new-generation missiles can be used more than once, and can be reloaded and refired if more missiles are available in nearby storage. Arms-control agreements would have to be worked out that would ban storage of extra missiles near the launcher. This was done for ICBMs in SALT II. The principal problem with mobile missiles is verification. The U.S. has taken the position that the side that proposes such deployments is obligated to devise an accompanying verification system satisfactory to the other side.

Finally, it should be noted that little progress has been made in working out verification procedures for aircraft other than the heavy bombers treated in SALT II. The smaller and more numerous the aircraft, the more difficult it is to monitor them. The very large numbers of aircraft whose sizes lie between medium-bomber and short-range tactical aircraft can deliver both nuclear and conventional weapons; so can cruise missiles. Some easily recognized external feature on the missile or the carrier that distinguishes between conventional and nuclear weapons may solve the verification problem in principle, but negotiations will still be difficult.

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Freezes present much the same verification problems as reduction schemes. SALT II was primarily a partial-freeze agreement, and the most time-consuming part of its negotiation concerned verification. In the current discussion of freezes, the importance of reaching an agreement in a relatively short time has stimulated some to propose that what is initially frozen be simply the items discussed in previous negotiations. This would include the strategic launchers of SALT II, atmospheric nuclear tests, and possibly anti-satellite weapons.

Another approach lies in taking the SALT II agreement as the starting point and modifying it to prohibit the deployment of the one new ballistic missile it allowed to each side, to carry out reductions over a number of years until 50 percent reductions have been achieved, and to halt the deployment of all cruise and Pershing II missiles in return for the elimination of the Soviet SS-4s, SS-5s, and SS-20s. This is about half a freeze and half a reduction scheme.

The real challenge comes in finding ways to meet the demanding requirements of those proposals that have produced such large public followings: to freeze the production, testing, and deployment of all nuclear-weapons systems on the two sides in a verifiable manner, and to negotiate this quickly enough to stop the arms race. Consider what this involves. It means devising and then negotiating verification procedures for the development, testing, production, and deployment of nearly a hundred kinds of weapons and delivery systems that make up the offensive and defensive forces at the strategic, intermediate, and battlefield levels of both sides. If stability is to be maintained in the long run, one must freeze countermeasures to these weapons, such as anti-submarine-warfare capabilities and air defenses. And one must decide what kind of maintenance and modernization is to be allowed for each weapons system. Are replacements to be allowed? If so, can they be improved versions of the same weapons systems? What if the original factories and components no longer exist? How much improvement is to be allowed?

A comprehensive freeze or comprehensive reductions would require extensive and elaborate negotiations. It seems unimaginable that such negotiations would not require several years, unless the arms-control budgets of the superpowers were raised a hundredfold or more, and many teams negotiated simultaneously and were convinced that both nations wanted a comprehensive agreement. This is the challenge presented by those who advocate a negotiated comprehensive freeze or comprehensive reductions.

It may be too easy, however, to undercut the freeze idea by driving it to its maximum interpretation. Much of the public would be satisfied with far less than a total freeze. The verification problems for less-than-total freezes might be less difficult. Total bans of some new weapons systems may be simpler to verify than limits, because only one sighting would be sufficient to prove a violation. However, in the end there would undoubtedly remain some systems that would require special verification measures inside the other country; such requirements would have to be met if the freeze were to be truly comprehensive.

It might be possible to freeze the most destabilizing weapons first, followed by less dangerous weapons. Here there is a conflict, however, between two strongly held points of view. Many want a freeze that will stop all technology and development as completely as possible. Others see danger in disassembling the whole nuclear-weapons research-and-development and production establishment. These groups see virtue in allowing certain developments to proceed in order to allow less vulnerable and more stable weapons to replace existing systems. For example, a freeze in 1959 would have stopped deployment of our invulnerable Polaris submarine-based missiles, which would have made the 1960s *less* safe. On the other hand, a freeze in 1969 would have avoided the instability that was caused by the introduction of MIRVs on missiles in the 1970s.

It is an open question whether a freeze today would enhance crisis stability or not. Some threatening systems would be stopped. But a freeze could also prevent such developments as the new small single-warhead land-based missile that many experts, including the Presidential Commission on Strategic Forces, believe is the best way to remedy the problems created by MIRVs.

Clearly, there is a strong case for pursuing discriminating restraints on weapons technology rather than a total freeze. One such limited freeze is a cap on the number of nuclear warheads—each side has roughly 11,000 warheads on weapons with ranges of over 1,000 miles—requiring that any warheads added to either arsenal be compensated for by at least an equal number withdrawn. This would be consistent with the simplicity that is the great virtue of the freeze idea. It leads to a quick agreement on what is to be frozen (strategic warheads); it might be negotiated soon; and it would be verifiable by the already negotiated SALT rules and procedures being observed by both sides, coupled with negotiated procedures to verify warheads on cruise missiles and intermediate-range missiles. The cap on warheads would avoid the potentially dangerous approach of freezing the modernization of certain forces while letting their countermeasures run free. Moreover, it would lead quickly to more complex arms-control negotiations without reducing Soviet incentives to bargain.

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Force restructuring is an approach that seeks simple agreements to change only certain weapons on each side. If other negotiations fail or proceed too slowly, it can still be tried. The proposed change could be one of several kinds: elimination, reduction, freeze, or replacement with new weapons less threatening to the other side. For example, the U.S. might propose, as it did several years ago, not to deploy the MX missile if the Soviet Union eliminated some proportion of its MIRVed ICBM force. Or, as the Soviet Union has already proposed, the construction and deployment of large ballistic-missile submarines could be stopped on both sides. If several such trades could be made in separate agreements, the effect would equal that of most proposed negotiations of a more comprehensive sort.

The most ambitious proposal of this kind seeks to solve one of the most debated problems confronting the two sides: the vulnerability of land-based missiles. This proposal would provide a schedule by which current land-based missiles would be replaced by much smaller mobile missiles. The schedule of replacements would be coordinated so that neither side could reap a temporary advantage. The key feature of the proposal is that the smaller missiles can carry only one warhead, and not a very large one. The consequence would be that over a period of 10 to 15 years, all the MIRVed land-based missiles on both sides would be replaced with single-warhead missiles, which are less useful in a first strike. This trade-off may appear to be unattractive to the Soviet Union, because of its investment in and commitment to large land-based missiles. It may be necessary to allow two or even three new missiles for each MIRVed land-based missile destroyed. In any event, the result would be not only a dramatic reduction in the numbers of warheads but a vast decrease in the vulnerability of the land-based forces of both sides, a feature that may become increasingly attractive to the Soviet government.

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Stabilizing measures aim not so much to diminish or restructure nuclear forces as to introduce ways to make their use less likely. They try to reduce the chance of accidents that might lead to war, to bolster crisis stability, to ban certain weapons and tests, and to build confidence in the East-West strategic relationship by introducing a much higher level of communication. A few examples will illustrate this approach.

An agreement for both sides to abandon the development of weapons in space, either for satellite destruction or for ballistic-missile defense, would profoundly improve all three kinds of stability—deterrence, arms-race, and crisis—over the next few decades. Satellites have become increasingly central to early warning and to the command and control of nuclear forces. An attack on them would so threaten to blind the others idea that it would be considered an act of war requiring immediate retaliation. Stopping work toward the capability to attack them would be mutually reassuring, as would stopping work on space stations from which ballistic missiles might be destroyed shortly after being launched. The costs of space stations might make them politically impossible, and their vulnerability would make them militarily unreliable; still, unless agreement is reached to prohibit them, development is likely to proceed on each side.

Stability would also be promoted by an agreement to prohibit the close approach of submarines to Soviet and American coasts, which puts bomber bases at special risk because it reduces warning time of an attack below that required for bombers to become airborne. Such an agreement would also reduce the risks of a "decapitation" strike, by giving more time for political leaders to evacuate in time of war. Another stabilizing measure would be an agreement defining ocean sanctuaries for submarines carrying nuclear missiles, reducing the likelihood of accident or misunderstanding in a crisis.

Another measure, already proposed at START, would be to agree to extensive notification of planned missile tests so that there would be no ambiguity when launches were observed. Bans or limits on flight tests (or nuclear tests) could help to reassure both sides that the pace of modernization of weapons was limited, and could reduce the confidence of any government considering striking first in a crisis.

Stabilizing measures and force-restructuring suggestions might best be handled by separately-organized and continuing talks involving, for example, staffs of the Joint Chiefs and their Soviet counterparts as well as representatives from the other parts of government usually involved. Such a continuing forum could also try to resolve other important matters that might become conflicts, such as naval incidents, the meaning of ambiguous intelligence reports, misunderstandings that might arise from changes in force deployments in places such as Poland and the Caribbean, and technological developments that may be of benefit to both sides.

The establishment of a joint crisis-management center, suggested by Senators Sam Nunn and Henry Jackson, deserves serious examination. They have each proposed that the currently existing hot line be supplemented by a jointly manned information center, where all facts relevant to a developing crisis would be examined and discussed within permitted limits. Even more radical developments might be possible, such as establishing linked teleconferencing centers in both capitals, again jointly manned, which would be ready for use by high-level government officials whenever needed.

A number of initiatives to build further confidence could also be tested and perhaps brought into operation through the technique of reciprocal restraint. For example, one side could announce that it would hold its nuclear submarines back a certain distance from the other's shores if the other side reciprocated, or that it would restrain its development of certain weapons if the other side did so. In short, even if formal and comprehensive arms control fails or proceeds slowly, there is much else that can be done outside such proceedings by means of separate steps. There is nothing to prevent such outside measures from being explored while formal negotiations are proceeding.

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When a country is faced with a military threat, there is a strong impetus to match that threat. But an equally valid response is to try to constrain the threat. Arms control is an effort to constrain the Soviet military threat. If pursued wisely, it can save money as well as enhance our security. It should be seen as a part of a national-security policy that is as important as the defense budget. The two are not alternatives. They are partners in the pursuit of stability and security.

Although reductions and freezes have captured the most attention, partial agreements, informal approaches, and stabilizing measures can be of equal importance in averting nuclear war. If properly applied, these various approaches can be complementary rather than competitive with each other.

Viewed this way, arms control has accomplished more in the past two decades than is sometimes realized by those who point to the absence of deep reductions. Certain areas and technologies (for example, anti-ballistic-missile systems) have been "fenced-off" from competition. A system has been set up to slow the spread of nuclear weapons to additional countries. Limits on existing arsenals may have helped to keep weapons and expenditures below what they otherwise might have been. Most important, the beginnings of a process of communication and cooperation have been established between the two major nuclear adversaries, and the process has weathered very difficult times.

Unfortunately, there are limits to what arms control can accomplish. It cannot be totally separated from the political problems in U.S.-Soviet relations. Even if both sides avoid the tactical temptation of linking progress on arms control to behavior in other political and economic matters, complete separation is impossible, particularly in democratic politics. Thus arms control will to some extent be limited by the overall condition of American relations with the Soviet Union. In the long run, arms control must be accompanied by some improvement in U.S.-Soviet relations if humanity is to cope with its nuclear predicament. □

The Danger of Thermonuclear War

By ANDREI SAKHAROV

"As long as there are nuclear weapons in the world," writes the author of this Open Letter, "there must be a strategic parity of nuclear forces so that neither side will venture to embark on a limited or regional nuclear war." Andrei Sakharov is the distinguished Soviet physicist, winner of the 1975 Nobel Peace Prize, currently in internal exile in Gorki. This article was in response to the materials noted, which had been sent to him by Professor Drell of Stanford. The translation from the Russian was done by Richard Lourie and Efrem Yankelevich. "Editor's Notes" appearing in footnotes are from *Foreign Affairs,* Summer 1983.

AN OPEN LETTER TO DR. SIDNEY DRELL

DEAR Friend:

I have read your two splendid lectures—the speech on nuclear weapons at Grace Cathedral, October 23, 1982, and the opening statement to Hearings on the Consequences of Nuclear War before the Subcommittee on Investigations and Oversight. What you say and write about the appalling dangers of nuclear war is very close to my heart and has disturbed me profoundly for many years now. I decided to address an open letter to you, feeling it necessary to take part in the discussion of this problem, one of the most important facing mankind.

In full agreement with your general theses, I will express certain considerations of a more specific nature which, I think, need to be taken into account when making decisions. These considerations in part contradict some of your statements and in part supplement and, possibly, amplify them. It seems to me that my opinion communicated here in open discussion can prove of interest in view of my scientific, technological, and psychological experience, acquired in the period when I took part in work on thermonuclear weapons, and also because I am one of the few independent participants in this discussion in the U.S.S.R.

II

I fully agree with your assessment of the danger of nuclear war. In view of the critical importance of this thesis, I will dwell on it in some detail, perhaps repeating what is already well known.

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Here, and later on, I use the terms "nuclear war" and "thermonuclear war" nearly interchangeably. Nuclear weapons mean atomic and thermonuclear weapons; conventional weapons mean any weapons with the exception of three types with the capability of mass destruction—nuclear, chemical, and bacteriological weapons.

A large nuclear war would be a calamity of indescribable proportions and absolutely unpredictable consequences, with the uncertainties tending toward the worse.

According to data from United Nations experts, by the end of 1980 the world's overall supply of nuclear weapons consisted of 50,000 nuclear charges.* The total power of these charges (most of which are in the 0.04- to 20-megaton range) amounts to 13,000 megatons according to the experts' estimates. The figures you have presented are not in conflict with those estimates. In this regard you mention that the total power of all the explosives used in the Second World War did not exceed six megatons (three megatons, according to the estimates with which I am familiar). However, when making this comparison one must take into account the greater relative efficacy of smaller charges with the same total power, but that does not alter the qualitative conclusions about the colossal destructive power of the nuclear weapons that have been amassed.

You also cite data according to which the U.S.S.R. at the present time (1982) has 8,000 thermonuclear charges deployed and the United States 9,000.** Many of these charges are warheads on ballistic missiles, and many of these are multiple independently-targetable reentry vehicles (MIRVs). It should be noted that the basis of the U.S.S.R.'s arsenal (70 percent, according to statements by TASS) consists of gigantic land-based missiles (in silos) and somewhat smaller intermediate-range missiles, on mobile launchers. Eighty percent of the U.S. arsenal consists of submarine-based nuclear missiles, much smaller but less vulnerable than silo-based missiles, and also of strategic bombers carrying nuclear bombs, some of which are apparently very powerful. It is doubtful whether masses of aircraft could penetrate Soviet territory deeply—but a more precise assessment of their capabilities must take the possibilities of cruise missiles into account; these would probably be able to penetrate the enemy's air defense systems.

Currently, the most powerful American ICBMs (I am not speaking of the planned MX) possess several times less throw-weight than the principal land-based Soviet missiles.† The American ones carry fewer MIRVs, and the yield of their warheads is less. (It is assumed that when dividing the throw-weight of a missile among several warheads—let's say 10—the aggregate yield of the multiple warheads is less than the yield of a large single warhead on the same missile. But MIRVs greatly increase the ability of one side to attack compact targets on the other. MIRVs are also highly destructive against targets spread out over a wide area such as large cities. The aggregate yield may be less than that of a large single warhead, but the destructiveness will remain high because of the multiple blasts spread out over the area. I have dwelt on these details since they may prove of substance in further discussion.)

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* *Editor's Note.* "Charge" is a standard Soviet term—used frequently in arms control negotiations—embracing warheads on ballistic missiles and also armaments aboard bombers, which may be in bomb or missile form. There is a separate Russian word for warheads.

** *Editor's Note.* These totals refer to the number of charges deployed on intercontinental ballistic missiles, submarine-launched ballistic missiles, and intercontinental-range bombers.

† *Editor's Note.* The term "throw-weight" is normally defined as the weight of effective payload that can be delivered to an intended distance; effective payload may include penetration aids and navigational equipment as well as the nuclear charge itself. The term "yield" refers to destructive power, and the term "compact targets," as used in this paragraph, clearly refers to military targets in general and to specially hardened ICBM sites in particular.

You cite the estimates of the international journal of the Royal Swedish Academy, according to which an attack on the principal cities of the Northern Hemisphere by 5,000 warheads with a total power of 2,000 megatons will kill 750 million people as a result of the shock wave alone.*

I would like to add the following to that estimate:

1. The overall number of long-range nuclear weapons possessed by the five nuclear powers is three or four times greater than the figure used in the Swedish estimate and their overall power is six to seven times greater. The accepted average number of casualties per missile—250,000 people—cannot be considered an overestimate if one compares the accepted average power of a thermonuclear charge of -00 kilotons with the power of the 17-kiloton explosion at Hiroshima and the number of victims from its shock waves, no fewer than 40,000.

2. An extremely important factor in the destructive capability of nuclear weapons is thermal radiation. The fires at Hiroshima were the cause of a significant portion (up to 50 percent) of the fatalities. With the increase of the charges' power, the relative role of thermal radiation increases. Therefore, this factor significantly increases the number of direct casualties.

3. During an attack on especially dense, compact enemy targets (like silo-based missile launchers, command points, communication centers, government institutions, shelters, and other of the more important targets) it must be assumed that a significant portion of the explosions will be ground-level or low. In such cases there inevitably will be "traces," bands of dust fallout raised by the explosion from the surface and "impregnated" by the products of uranium fission. Therefore, although the direct radioactive effect of a nuclear charge takes place in a zone where eveything alive is, in any case, annihilated by the shock wave and by fire, its indirect effect—through fallout—proves very substantial. The area contaminated by fallout so that the total dose of radiation exceeds the safety limit of 300 roentgens is, for a typical one-megaton nuclear charge, thousands of square kilometers!

During the ground-level test of the Soviet thermonuclear charge in August 1953, tens of thousands of people were evacuated beforehand from the zone where fallout was possible. People were only able to return to the settlement of Kara-aul in the sping of 1954! In war conditions an orderly evacuation is impossible. Hundreds of millions will flee in panic, often from one contaminated zone into another. Hundreds of millions of people will inevitably become the victims of radioactive irradiation, the mass migrations of people will make the chaos, the deterioration of sanitary conditions and the hunger all the greater. The genetic consequences of irradiation will threaten man as a biological species and all animal and plant life on the earth.

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* *Editor's Note.* This estimate is contained in the publication of the Royal Swedish Academy *Ambio,* Vol. XI, Nos. 2-3, 1982.

I entirely agree with your basic idea that mankind has *never* encountered anything even remotely resembling a large nuclear war in scale and horror.

No matter how appalling the direct consequences of nuclear explosions, we cannot exclude that the indirect effects will be even more substantial. The indirect effects could be fatal for modern society, which is extraordinarily complex and thus highly vulnerable.

The general ecological consequences are just as dangerous, although by virtue of the complex nature of ecological interdependencies, forecasts and estimates are extremely difficult here. I will mention some of the problems discussed in the literature (in your talks, in particular) without assessing their seriousness, although I am certain that many of the dangers indicated are entirely real:

1. Continuous forest fires could destroy the greater part of the planet's forests. The smoke involved would destroy the transparency of the atmosphere. A night lasting many weeks would ensue on earth followed by a lack of oxygen in the atmosphere. As a result, this factor alone, if real, could destroy life on the planet. In less pronounced form, this factor could have important ecological, economic, and psychological consequences.

2. High-altitude wartime nuclear explosions in space (particularly the thermonuclear explosion of ABM missiles and the explosion of attacking missiles whose purpose is to disrupt enemy radar) could possibly destroy or seriously damage the ozone layer protecting earth from the sun's ultraviolet radiation. Estimates of this danger are very imprecise—if the maximal estimates are true then this factor is sufficient to destroy life.

3. Disruption of transportation and communication could prove critical in the complex modern world.

4. No doubt there will be a (complete or partial) disruption in the production and distribution of food, in water supply and sewage, in fuel and electric service, and in medicine and clothing—all on a continent-wide scale. The public health-care system will be disrupted, sanitary conditions will revert to a medieval level and may become even worse than that. It will be impossible in practice to provide medical assistance to the hundreds of millions who have been wounded, burned, or exposed to radiation.

5. Hunger and epidemics in a context of chaos and devastation could take more lives than the nuclear explosions would take directly. It is also not out of the question that, along with the "ordinary" diseases which will inevitably spread far and wide—influenza, cholera, dysentery, typhus, anthrax, plague, and others—entirely new diseases could arise as the result of the radiation-caused mutation of viruses as well as especially dangerous forms of the old diseases against which people and animals would have no immunity.

6. It is especially difficult to foresee mankind's maintaining any social stability in conditions of universal chaos. Great gangs will kill and terrorize

people and struggle among themselves in keeping with the laws of the criminal world: "You die today, I'll die tomorrow."

Of course, our experience of social upheaval and war demonstrates that mankind possesses unexpected reserves; people's vitality in extreme situations surpasses what could have been imagined a priori. But even if mankind were able to preserve itself as a social body, which seems highly unlikely, the most important social institutions—the foundation of civilization—would be destroyed.

In sum, it should be said that all-out nuclear war would mean the destruction of contemporary civilization, hurl man back centuries, cause the deaths of hundreds of millions or billions of people, and, with a certain degree of probability, would cause man to be destroyed as a biological species and could even cause the annihilation of life on earth.

Clearly it is meaningless to speak of victory in a large nuclear war which is collective suicide.

I think that basically my point of view coincides with yours as well as with the opinion of a great many people on earth.

III

I am also in complete agreement with your other conclusions. I agree that if the "nuclear threshold" is crossed, i.e., if any country uses a nuclear weapon even on a limited scale, the further course of events would be difficult to control and the most probable result would be swift escalation leading from a nuclear war initially limited in scale or by region to an all-out nuclear war, i.e., to general suicide.

It is relatively unimportant how the "nuclear threshold" is crossed—as a result of a preventive nuclear strike or in the course of a war fought with conventional weapons, when a country is threatened with defeat, or simply as a result of an accident (technical or organizational).

In view of the above, I am convinced that the following basic tenet of yours is true: *Nuclear weapons only make sense as a means of deterring nuclear aggression by a potential enemy,* i.e., a nuclear war cannot be planned with the aim of winning it. Nuclear weapons cannot be viewed as a means of restraining aggression carried out by means of conventional weapons.

Of course you realize that this last statement is in contradiction to the West's actual strategy in the last few decades. For a long time, beginning as far back as the end of the 1940s, the West has not been relying on its "conventional" armed forces as a means sufficient for repelling a potential aggressor and for restraining expansion. There are many reasons for this—the West's lack of political, military, and economic unity; the striving to avoid a peacetime militarization of the economy, society, technology, and science; the low numerical levels of the Western nations' armies. All that at a time when the U.S.S.R. and the other countries of the socialist camp have armies with great numerical strength and are rearming them intensively, sparing no resources. It is possible that for a limited period of time the mutual nuclear terror had a certain restraining effect on the course of world events. But, at the present time, the balance of nuclear terror is a dangerous remnant of the past! In order to avoid aggression with conventional weapons one cannot threaten to use nuclear weapons if their use is inadmissible. One of the conclusions that follows here—and a conclusion you draw—is that it is necessary to restore strategic parity in the field of conventional weapons. This you expressed somewhat differently, and without stressing the point.

Meanwhile this is a very important and non-trivial statement which must be dwelt on in some detail.

The restoration of strategic parity is only possible by investing large resources and by an essential change in the psychological atmosphere in the West. There must be a readiness to make certain limited economic sacrifices and, most important, an understanding of the seriousness of the situation and of the necessity for some restructuring. In the final analysis, this is necessary to prevent nuclear war, and war in general. Will the West's politicians be able to carry out such a restructuring? Will the press, the public, and our fellow scientists help them (and not hinder them as is frequently now the case)? Can they succeed in convincing those who doubt the necessity of such restructuring? A great deal depends on it—the opportunity for the West to conduct a nuclear arms policy that will be conducive to the lessening of the danger of nuclear disaster.

In any case, I am very glad that you (and earlier, in another context, Professor Panofsky) have spoken out in favor of strategic parity in the area of conventional weapons.*

In conclusion, I should stress especially that a restructuring of strategy could of course only be carried out gradually and very carefully in order to prevent a loss of parity in some of the intermediate phases.

IV

As I have understood them, your further thoughts on nuclear weapons per se amount to the following:

It is necessary to conduct a balanced reduction of the nuclear arsenal, and a first stage in this process of nuclear disarmament might be a mutual freeze on the currently existing nuclear arsenals. I will quote you: "Decisions in the area of nuclear weapons should be based simply on the criterion of achieving a reliable deterrent and not on other additional demands relating to nuclear war since, generally speaking, such demands are not limited by anything and are not realistic." This is one of your central theses.

For talks on nuclear disarmament you propose that one quite simple—and, within the limits of the possible, fair—criterion for assessing nuclear strength be worked out. As that criterion you propose taking the sum total of the number of delivery vehicles and the total number of nuclear charges which can be delivered (probably one should assume the maximal number of certain standard or conventional charges which can be delivered by a given type of missile with a corresponding division of the usable weight).

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* *Editor's Note.* The reference here is to Wolfgang K.H. Panofsky, professor of physics at Stanford and director of the Stanford Linear Accelerator Center. Professor Panofsky notes that the statement accurately reflects his views.

I will begin by discussing that latter proposal of yours (made jointly with your student, Kent Wisner) * This proposal seems practical to me. Your criterion takes into account delivery vehicles of various throw-weights by assigning them various weight factors. This is very important—the assigning of an equal weight factor to both the small American missiles and the large Soviet missiles was one of the points for which I, at one time, criticized the SALT I treaty (while in general viewing the very fact of the talks and the concluding of the treaty in a positive light). Here, in distinction to criteria using the power of the charge, as a rule not published officially, the number of deliverable charges is easy to determine. Your criterion also takes into account the fact that, for example, five missiles each carrying one warhead have a significant tactical advantage over one large missile carrying five warheads. Of course, the criterion you propose does not encompass all the parameters like distance, accuracy, or degree of vulnerability—they will have to be allowed for supplementarily or, in some cases, not taken into account so as to facilitate agreements.

I hope that your (or some analogous) criterion will be accepted as the basis for negotiations both on intercontinental missiles and (independently) on medium-range missiles. In both cases it will be much more difficult than it now is to insist on unfair conditions in the agreements and possible to move from word to deed more swiftly. Most likely, the very acceptance of your (or an analogous) criterion will require a diplomatic and propaganda struggle —but it's worth it.

V

From this relatively specific question I will move to one more general, more complex and controversial. Is it actually possible when making decisions in the area of nuclear weapons to ignore all the considerations and requirements relevant to the possible scenarios for a nuclear war and simply limit oneself to the criterion of achieving a reliable deterrent—when that criterion is understood to mean an arsenal sufficient to deal a devastating blow in response? Your answer to this question—while perhaps formulating it somewhat differently—is positive and you draw far-reaching conclusions.

There is no doubt that at present the United States already possesses a number of submarine-based missiles and charges carried by strategic bombers which are not vulnerable to the U.S.S.R. and, in addition, has silo-based missiles though they are smaller than the U.S.S.R.'s—all these in such amounts that, were those charges used against the U.S.S.R., nothing, roughly speaking, would be left of it. You maintain that this has *already* created a reliable de-

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**Editor's Note.* The proposal was originally set forth in Sidney D. Drell and Kent F. Wisner, "A New Formula for Nuclear Arms Control," *International Security,* Winter 1980/81, pp. 186-194 and is refined in Dr. Drell's "L † RV: A Formula for Arms Control," *The Bulletin of the Atomic Scientists,* April 1982, pp. 28-34.

terrent—independently of what the U.S.S.R. and the United States have and what they lack! Therefore, you specifically consider the building of the MX missile unnecessary and similarly consider irrelevant the arguments which are advanced in support of developing it—the U.S.S.R.'s substantial arsenal of intercontinental missiles with large throw-weight which the United States does not have; and the fact that Soviet missiles and MX missiles have multiple warheads so that one missile can destroy several enemy silos during a missile duel. Therefore you consider it acceptable (with certain reservations) for the United States to freeze the nuclear arsenals of the United States and the U.S.S.R. at their current numerical levels.*

Your line of reasoning seems to me very strong and convincing. But I think that the concept presented fails to take into account all the complex realities of the opposition that involves two world systems and that there is the necessity (despite your stance) for a more specific and comprehensive unbiased consideration than a simple orientation toward a "reliable deterrent" (in the meaning of the word as formulated above, i.e., the possibility of dealing a devastating retaliatory strike). I will endeavor to explain this statement.

Precisely because an all-out nuclear war means collective suicide, we can imagine that a potential aggressor might count on a lack of resolve on the part of the country under attack to take the step leading to that suicide, i.e., it could count on its victim capitulating for the sake of saving what could be saved. Given that, if the aggressor has a military advantage in some of the variants of conventional warfare or—which is also possible *in principle*—in some of the variants of partial (limited) nuclear war, he would attempt to use the fear of further escalation to force the enemy to fight the war on his (the aggressor's) own terms. There would be little cause for joy if, ultimately, the aggressor's hopes proved false and the aggressor country perished along with the rest of mankind.

You consider it necessary to achieve a restoration of strategic parity in the field of conventional arms. Now take the next logical step—while nuclear weapons exist it is also necessary to have strategic parity in relation to those variants of limited or regional nuclear warfare which a potential enemy could impose, i.e., it is really *necessary* to examine in detail the various scenarios for both conventional and nuclear war and to analyze the various contingencies. It is of course not possible to analyze fully all these possibilities or to ensure security entirely. But I am attempting to warn of the opposite extreme—"closing one's eyes" and relying on one's potential enemy to be perfectly sensible. As always in life's complex problems, some sort of compromise is needed.

Of course I realize that in attempting not to lag behind a potential enemy in any way, we condemn ourselves to an arms race that is tragic in a world with so many critical problems admitting of no delay. But the main danger is slipping into an all-out nuclear war. *If* the probability of such an outcome could be reduced at the cost of another 10 or 15 years of the arms race, then perhaps that price must be paid while, at the same time, diplomatic, economic, ideological, political, cultural, and social efforts are made to prevent a war.

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* *Editor's Note.* Professor Drell notes that maintaining the U.S. and Soviet nuclear arsenals at their present numerical levels is not the same as the kind of "freeze" usually discussed today—in that it would not preclude changes in the types of weapons within the numerical level. As to a strict "freeze" as usually discussed, Professor Drell's position, stated in his Grace Cathedral speech, is that "the freeze movement has been very helpful in creating... a constituency for arms control. Though I recognize some deficiencies of the freeze as literal policy, I support it and will vote for it as a mandate for arms control."

Of course it would be wiser to agree now to reduce nuclear and conventional weapons and to eliminate nuclear weapons entirely. But is that now possible in a world poisoned with fear and mistrust, a world where the West fears aggression from the U.S.S.R., the U.S.S.R. fears aggression from the West and from China, and where China fears it from the U.S.S.R., and no verbal assurances and treaties can eliminate those dangers entirely?

I know that pacifist sentiments are very strong in the West. I deeply sympathize with people's yearning for peace, for a solution to world problems by peaceful means; I share those aspirations fully. But, at the same time, I am certain that it is absolutely necessary to be mindful of the specific political, military, and strategic realities of the present day and to do so objectively without making any sort of allowances for either side; this also means that one should not proceed from an a priori assumption of any special peace-loving nature in the socialist countries due to their supposed progressiveness or the horrors and losses they have experienced in war. Objective reality is much more complicated and far from anything so simple. People both in the socialist and the Western countries have a passionate inward aspiration for peace. This is an extremely important factor, but, I repeat, itself alone does not exclude the possibility of a tragic outcome.

VI

What is necessary now, I believe, is the enormous practical task of education so that specific, exact, and historically and politically meaningful objective information can be made available to all people, information that will enjoy their trust and not be veiled with dogma and propaganda. Here one must take into account that, in the countries of the West, pro-Soviet propaganda has been conducted for quite a long time and is very goal-oriented and clever, and that pro-Soviet elements have penetrated many key positions, particularly in the mass media.

The history of the pacifist campaigns against the deployment of missiles in Europe is telling in many respects. After all, many of those participating in those campaigns entirely ignore the initial cause of NATO's "dual decision"—the change in strategic parity in the 1970s in favor of the U.S.S.R.—and, when protesting NATO's plans, they have not advanced any demands on the U.S.S.R. Another example: President Carter's attempt to take a minimal step toward achieving balance in the area of conventional arms, i.e., to introduce draft registration, met with stiff resistance. Meanwhile, balance in the area of conventional arms is a necessary prerequisite for reducing nuclear arsenals. For public opinion in the West to assess global problems correctly, in particular the problems of strategic parity both in conventional and in nuclear weapons, a more objective approach, one which takes the real world strategic situation into account, is vitally needed.

VII

A second group of problems in the field of nuclear weapons about which I should make a few supplementary remarks here concerns the talks on nuclear disarmament. For these talks to be successful the West should have something that it can give up! The case of the "Euromissiles" once again demonstrates how difficult it is to negotiate from a position of weakness. Only very recently has the U.S.S.R. apparently ceased to insist on its unsubstantiated thesis that a rough nuclear parity now exists and therefore everything should be left as it is.

Now, the next welcome step would be the reduction of the number of missiles—which must include a fair assessment of the *quality* of missiles and other means of delivery (i.e., the number of charges deliverable by each carrier, its range and accuracy, and its degree of vulnerability—the last being greater for aircraft and less for missiles;* most likely, it would be expedient to use your criterion, or analogous ones). And what is absolutely at issue here is not moving the missiles beyond the Urals but *destroying* them. After all, rebasing is too "reversible." Of course, one also must not consider powerful Soviet missiles, with mobile launchers and several warheads, as being equal to the now-existing Pershing I, the British and French missiles, or the bombs on short-range bombers—as the Soviet side sometimes attempts to do for purposes of propaganda.

No less important a problem is that of the powerful silo-based missiles. At present the U.S.S.R. has a great advantage in this area. Perhaps talks about the limitation and reduction of these most destructive missiles could become easier if the United States were to have MX missiles, albeit only potentially (indeed, that would be best of all).

A few words about the military capabilities of powerful missiles: they can be used to deliver the largest thermonuclear charges for destroying cities and other major enemy targets—while for exhausting the enemy's ABM systems there will most likely be a simultaneous use of a "rain" of smaller missiles, false targets and so on. (Much is written about the possibility of developing ABM systems using super-powerful lasers, accelerated particle beams, and so forth. But the creation of an effective defense against missiles along these lines seems highly doubtful to me.) We present the following estimates to give an idea of what a powerful missile attack on a city would be like. Assuming that the maximal power of an individual charge carried by a large rocket would be of a magnitude of 15-25 megatons, we find that the area of complete destruction of dwellings would be 250–400 square kilometers, the area affected by thermal radiation would be 300–500 square kilometers, the zone of radioactive traces (in case of a ground-level explosion) would be 500-1000 kilometers long and 50-100 kilometers wide!

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* *Editor's Note.* The reference to greater relative vulnerability of aircraft vis-a-vis missiles apparently refers to vulnerability to defensive measures in the execution of a mission.

Of equal importance is the fact that powerful MIRVed missiles could be used to destroy compact enemy targets, in particular, similar silo-based enemy missiles. Here is a rough estimate of an attack of that type on launch sites. One hundred MX missiles (the number proposed by the Reagan Administration for the first round of deployment) could carry one thousand 600-kiloton warheads.

Considering the ellipse of concentration* and the hardness assumed for the Soviet launch sites, each of the warheads has, according to the data published in the American press, a 60-percent probability of destroying one launch site. During an attack on 500 Soviet launch sites, with two warheads targeted for each site, 16 percent will remain undamaged, i.e., "only" 80 missiles.

A specific danger associated with silo-based missiles is that they can be destroyed relatively easily as a result of enemy attack, as I have just demonstrated. At the same time, they can be used to destroy enemy launch sites in an amount four to five times larger than the number of missiles used for the attack. A country with large numbers of silo-based missiles (at the present time this is primarily the U.S.S.R., but if the United States carries out a major MX program, then it too) could be "tempted" to use such missiles first before the enemy destroys them. In such circumstances the presence of silo-based missiles constitutes a destabilizing factor.

In view of the above, it seems very important to me to strive for the abolition of powerful silo-based missiles at the talks on nuclear disarmament. While the U.S.S.R. is the leader in this field there is very little chance of its easily relinquishing that lead. If it is necessary to spend a few billion dollars on MX missiles to alter this situation, then perhaps this is what the West must do. But, at the same time, if the Soviets, in deed and not just in word, take significant verifiable measures for reducing the number of land-based missiles (more precisely, for destroying them), then the West should not only abolish MX missiles (or not build them!) but carry out other significant disarmament programs as well.

On the whole I am convinced that nuclear disarmament talks are of enormous importance and of the highest priority. They must be conducted continuously—in the brighter periods of international relations but also in the periods when relations are strained—and conducted with persistence, foresight, firmness and, at the same time, with flexibility and initiative. In so doing, political figures should not think of exploiting those talks, and the nuclear problem in general, for their own immediate political gains but only for the long-term interests of their country and the world. And the planning of the talks should be included in one's general nuclear strategy as its most important part—on this point as well I am in agreement with you!

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* *Editor's Note.* This phrase is a literal translation from the Russian. It apparently refers to the shape and size of the area in which a given missile is likely to land in accordance with its accuracy characteristics. The comparable American term is "circular error probable," or "CEP," defined as the area within which a given missile has a 50-percent chance of landing. Such an area is in fact usually elliptical in shape rather than circular.

VIII

The third group of problems which should be discussed here is political and social in nature. A nuclear war could result from a conventional war, while a conventional war is, as is well known, a result of politics. We all know that the world is not at peace. There are a variety of reasons for this—national, economic, and social reasons, as well as the tyranny of dictators.

Many of the tragic events now occurring have their roots in the distant past. It would absolutely be wrong to see only Moscow's hand everywhere. Still, when examining the general trend of events since 1945 there has been a relentless expansion of the Soviet sphere of influence—objectively, this is nothing but Soviet expansion on a world scale. This process has spread as the U.S.S.R. has grown stronger economically (though that strength is one-sided), and in scientific, technological and military terms, and has today assumed proportions dangerously harmful to international equilibrium. The West has grounds to worry that the world's sea routes, Arab oil, and the uranium, diamonds, and other resources of South Africa are now threatened.

One of the basic problems of this age is the fate of the developing countries, the greater part of mankind. But, in fact, for the U.S.S.R., and to some degree for the West as well, this problem has become exploitable and expendable in the struggle for dominance and strategic interests. Millions of people are dying of hunger every year, hundreds of millions suffer from malnutrition and hopeless poverty. The West provides the developing countries with economic and technological aid, but this remains entirely insufficient due largely to the rising price of crude oil. Aid from the U.S.S.R. and the socialist countries is smaller in scale and, to a greater degree than the West's aid, military in nature and bloc-oriented. And, very importantly, that aid is in no way coordinated with world efforts.

The hot spots of local conflicts are not dying but are rather threatening to grow into global wars. All this is greatly alarming.

The most acutely negative manifestation of Soviet policies was the invasion of Afghanistan which began in December 1979 with the murder of the head of state. Three years of appallingly cruel anti-guerrilla war have brought incalculable suffering to the Afghan people, as attested by the more than four million refugees in Pakistan and Iran.

It was precisely the general upsetting of world equilibrium caused by the invasion of Afghanistan and by other concurrent events which was the fundamental reason that the SALT II agreement was not ratified. I am with you in regretting this but I cannot disregard the reasons I have just described.

Yet another subject closely connected to the problem of peace is the openness of society and human rights. I use the term the "openness of society" to mean precisely what the great Niels Bohr meant by it when introducing it more than 30 years ago.

In 1948, the U.N.'s member states adopted the Universal Declaration of Human Rights and stressed its significance for maintaining peace. In 1975, the relationship of human rights and international security was proclaimed by the Helsinki Final Act, which was signed by 35 countries including the

U.S.S.R. and the United States. Among those rights are: the right to freedom of conscience; the right to receive and impart information within a country and across frontiers; the right to a free choice of one's country of residence and domicile within a country; freedom of religion; and freedom from psychiatric persecution.

Finally, citizens have the right to control their national leaders' decision-making in matters on which the fate of the world depends. But we don't even know how, or by whom, the decision to invade Afghanistan was made! People in our country do not have even a fraction of the information about events in the world and in their own country which the citizens of the West have at their disposal. The opportunity to criticize the policy of one's national leaders in matters of war and peace as you do freely is, in our country, entirely absent. Not only critical statements but those merely factual in nature, made on even much less important questions, often entail arrest and a long sentence of confinement or psychiatric prison.

In keeping with the general nature of this letter, I refrain here from citing many specific examples, but must mention the fate of Anatoly Shcharansky, who is wasting away in Chistopol Prison for the right to be visited by his mother and to write to her,* and Yuri Orlov who, now for a third time, has been put for six months in the punishment block of a Perm labor camp, after having been beaten unmercifully in the presence of a warden.

In December 1982 there was an amnesty to honor the U.S.S.R.'s 60th anniversary but, just as in 1977 and in the preceding amnesties, there was a point made of excluding prisoners of conscience. So distant is the U.S.S.R. from the principles it proclaims, a country which bears such great responsibility for the fate of the world!

IX

In conclusion I again stress how important it is that the world realize the absolute inadmissibility of nuclear war, the collective suicide of mankind. It is impossible to win a nuclear war. What is necessary is to strive, systematically though carefully, for complete nuclear disarmament based on strategic parity in conventional weapons. As long as there are nuclear weapons in the world, there must be a strategic parity of nuclear forces so that neither side will venture to embark on a limited or regional nuclear war. Genuine security is possible only when based on a stabilization of international relations, a repudiation of expansionist policies, the strengthening of international trust, openness and pluralization in the socialist societies, the observance of human rights throughout the world, the rapprochement—convergence—of the socialist and capitalist systems, and worldwide coordinated efforts to solve global problems.

February 2, 1983 *Andrei Sakharov*

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* *Editor's Note.* At the time this Open Letter was written, Shcharansky was on a hunger strike, because he was denied all contact with his family. He has since been permitted an exchange of letters with his mother, and has ended his fast.

Why Strategic Superiority Matters

By ROBERT JASTROW

"The United States," argues the author, "has gone on a nuclear alert three times in the past—in 1948 in the Berlin crisis, in the 1962 Cuban missile crisis, and in 1973 when the Russians threatened to intervene in the war between Egypt and Israel. In the first two cases we had a strategic superiority, and in the third a rough parity. Today this is no longer true." Robert Jastrow was the founder of NASA's Institute for Space Studies and served as its director until his retirement in 1981. He is now professor of earth sciences at Dartmouth. His most recent book is ***The Enchanted Loom: Mind in the Universe.***

WHEN I was a young physicist I spent a year working on nuclear-physics problems with Robert Oppenheimer at Princeton. I then went out to the Lawrence Radiation Laboratory in Berkeley, where I shared an apartment for a time with Harold Brown, who later became Secretary of Defense in the Carter Administration. My friendship with Dr. Brown brought me into contact with Herbert York and the weapons physicists in Berkeley, and that led to a job on the Greenhouse project.

The Greenhouse experiment, which took place in 1951 on Eniwetok atoll in the Pacific, was supposed to create the first man-made thermonuclear reaction, using the energy of a 500-kiloton atomic bomb to ignite a fraction of an ounce of deuterium and tritium placed in a small adjoining chamber. The project was more of a public-relations stunt than a genuine experiment, because everyone knew beforehand that it was pretty certain to work; using a huge atomic bomb to ignite the little vial of deuterium and tritium was like using a blast furnace to light a match. According to my understanding at the time, Edward Teller was trying to get support for the H-bomb project, and since he could not figure out how to build an H-bomb, he thought up the Greenhouse project instead, as a demonstration piece for the people back in Washington.

In any case, my job on Greenhouse was to calculate the temperature of the reacting mixture of deuterium and tritium. As I recall, it was supposed to hit a million degrees or so, which is beyond the range of an ordinary thermometer. As the house theorist, I applied the methods of the branch of physics known as radiative transfer theory to compute the temperature inside the vessel of deuterium and tritium, using measurements on the amount of radiation coming from the outside. It was the kind of calculation astronomers do

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routinely for the hot gases in stars, and later on I was to do it quite often in NASA, as a part of my work in astrophysics and planetary science.

The Greenhouse assignment led to a trip to the Pacific and a close look at a 500-kiloton atomic explosion. I also had a chance to work with some very bright people, such as Drs. Teller, York, and Brown, and later on, at Los Alamos, with Stanley Ulam, George Gamow, and others. And, of course, there was a great deal of government and Atomic Energy Commission politics swirling around the figures of Oppenheimer, Teller, and Lawrence, of which I had an intimate and revealing worm's-eye view. But that is another story.

I left nuclear research in 1958 when I joined NASA. I did not think much about it, or about nuclear bombs, for the next 20 years until, three years ago, I happened to come across a *New Yorker* article on nuclear weapons and SALT by Daniel Patrick Moynihan (November 19, 1979). In reading Senator Moynihan's article, I became aware for the first time that the policies of the United States for protecting its citizens from destruction are based on a flawed premise.

The premise is that the Soviet Union will be deterred from a surprise nuclear attack on the United States by the knowledge that such an attack would trigger a devastating American counterattack. And, of course, *we* are deterred from an attack on the U.S.S.R. by the knowledge that the Soviets maintain a similar arsenal. The result is a nuclear standoff, and world peace.

In other words, each side holds the other side's civilian population as hostages. Holding hostages, and threatening their massacre, are time-honored methods for achieving one's objectives in war, but they have never been suggested before as a means of keeping the peace. The proposal for mass exchange of hostages is a simple but brilliant strategy conceived by American intellectuals who were trying to figure out a solution to a terrible problem: how does the U.S. protect itself from nuclear destruction in an age in which missiles vault the oceans and the concept of Fortress America no longer has meaning?

The academicians who thought up this idea called it Mutual Assured Destruction, or sometimes simply MAD. It makes very good sense, as you would expect, since the policy was formulated by some of the most brilliant scientists and academicians who have ever served in an advisory capacity to our Government. The trouble is that MAD is a theory, and like all theories, it depends on an assumption. This assumption has turned out to be false.

The assumption behind the theory of Mutual Assured Destruction is that both the United States and the U.S.S.R. will freely offer up their populations for massacre. But this requires that each country give up all attempts to defend its own people. In other words, the two countries must agree that neither will have a civil-defense program, and neither side will try to shoot down the other side's missiles.

On the face of it, this proposal sounds peculiar. What does it mean, as Senator Moynihan wrote, to say "we must not defend ourselves because if we do the enemy will attack"? As a physicist once remarked of Einstein's theory of relativity, when you first hear this line of reasoning you think you must have misunderstood it, and when you understand it you think you must have misheard it.

Actually, MAD is a logical response to the problem of nuclear war, and it could have worked, *if* the Russians had been reasonable and seen matters our way—if they had been willing to offer up their people as hostages, just as we have done. But the Soviet Union saw things differently.

It is now clear—in fact it has been clear for a decade—that while for many years the American Government adopted the strategy of Mutual Assured Destruction proposed by our scientists and academicians, the Soviet Government rejected it. The U.S.S.R. undertook to do exactly what our strategists say it is supposed not to do: it implemented large programs for defending its citizens from nuclear attack, for shooting down American missiles, and for fighting and winning a nuclear war. The result, as Senator Moynihan has said, is "a policy in ruins," and the greatest peril our nation has faced in its 200-year history.

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Why did the Russians reject the American plan for avoiding nuclear war? Perhaps the reason is that the strategy of Mutual Assured Destruction is very logical, and therefore appealing to a scientist; it is what a physicist might call a "sweet" solution to a difficult problem. Now scientists have an important voice in formulating American defense policy; after all, a physicist became Secretary of Defense in the Carter Administration. But in the Soviet Union scientists carry little or no weight in defense matters. Andrei Sakharov—the great colossus of Soviet atomic weaponry, with the stature of Oppenheimer and Teller rolled up in one—tells the story of a banquet attended by Soviet generals and scientists following the first test of a Russian H-bomb in 1955. Sakharov, who had designed the bomb and was responsible for its success, toasted the achievement with a wish that the Russian bomb would never be exploded over cities. The general in charge of the tests replied to the effect that the job of a scientist was to make the bombs, and how they were used was none of his business.

In any case, the Russians have made it clear that they think the theories of the American scientist-advisers are crazy, and they want no part of them. Their rejection goes beyond the concept of Mutual Assured Destruction itself; they reject the view, so widely held in America, that the mass detonation of nuclear weapons would mean the end of civilization, and, therefore, that these weapons are not useful tools of military policy.

At one time, Soviet thinking on nuclear war did echo American ideas on the impossibility of a nuclear victory. That was in the 1950s, soon after Stalin's death, when Malenkov, who was then the Soviet premier, announced that nuclear war could lead to the "destruction of world civilization." But Malenkov was severely criticized by Khrushchev, who said he had it wrong; only capitalism would perish in a nuclear war. By the mid-1960s the debate was over, and the elements of Soviet nuclear policy were set in concrete. In 1979, Secretary of Defense Brown confirmed that since 1963, "The Soviets have had a policy of building forces for a preemptive attack on United States ICBMs."

And in fact Soviet military writings make it plain that the entire war-fighting posture of the Soviet General Staff rests on the mass use of nuclear missiles:

> The most important task of the General Staff in preparing for a modern war is the detailed planning of employment of nuclear weapons by all services of the armed forces.*
>
> The armed forces of the Soviet Union...must be prepared above all to wage war under conditions of the mass use of nuclear weapons.**
>
> The basic method of waging war will be massed nuclear rocket attack....†
>
> Nuclear missile strikes...and the ability to use them before the opponent does, are the key to victory.††
>
> It is recommended that the nuclear strike be launched...unexpectedly for the enemy. Preemption in launching a nuclear strike is expected to be the decisive condition for the attainment of superiority.†††

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Some American scientists and arms-control experts find it hard to believe that the Russians can actually hold these views on the massive use of nuclear weapons. They feel that if the Russian generals think they can fight and win a nuclear war, the reason must be that the generals have not thought the question through carefully. "I don't think we should substitute their judgment for our common sense," said Paul Warnke about the matter. Warnke, who was President Carter's chief arms-control negotiator, thought Russian thinking about emerging victorious from a nuclear war was "primitive," and the United States "ought to educate them into the real world of strategic nuclear weapons."

But the Russians have refused to be educated. Around 1963, in pursuit of their objective of winning a nuclear war if it should break out, they began a massive program for building nuclear bombs, missiles, and submarines. In the next few years, American satellites photographed new missile silos sprouting all over the Soviet Union. In 1967, the Russians built 160 new silos; in 1968, they added 340 more; in 1969, they drew abreast of the United States. By then each side had about 1,000 silos and a like number of missiles.

None of this bothered American strategists because their policy of Mutual Assured Destruction required that each country must have enough nuclear destructive power to kill a lot of the other fellows. Secretary of Defense Robert McNamara had figured out that we had enough bombs to kill at least 50 million Russians directly in a mass nuclear attack, in addition to millions who would die later from radiation poisoning. He stated that he thought this was sufficient to deter the Russians from starting anything. Therefore, in 1967, he froze the United States force of ICBMs at 1,000 Minutemen plus 54 of the older Titans. He also froze the number of missiles carried by our nuclear submarines at 656. Secretary McNamara had said a few years earlier: "There is no indication that the Soviets are seeking to develop a strategic nuclear force as large as our own." The Secretary was relaxed about the Soviet buildup; his feeling was that if the Soviets improved their capabilities for blowing us up, they could be more equal partners in the strategy of Mutual Assured Destruction, and the peace of the world would be more secure.

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* *Voyennaya mysl'* ("Military Thought") October 1964, p. 23; quoted in *Soviet Strategy for Nuclear War*, edited by J.D. Douglass, Jr and A.M. Hoeber (Hoover Institution Press, 1979). According to Douglass and Hoeber, *Voyennaya mysl'* is a confidential journal designed for internal use by the Soviet General Staff and officers of the Soviet armed forces.

** V.D. Sokolovskiy, *Voyennayas trategiys* ("Military Strategy"), p. 193, edited by H.F. Scott (Crane, Russak, 1975).

† *Ibid.*, p. 210.

†† Byely *et al.*, *Marxism-Leninism on War and Army* (*A Soviet View*), trans. U.S. Air Force, Soviet Military Thought Series No. 2 (Government Printing Office), p. 217; quoted in Douglass and Hoeber, p. 38.

††† A.A. Sidorenko, *The Offensive* (*A Soviet View*) (Moscow: Voyenizdat, 1970), trans. U.S. Air Force, Soviet Military Thought Series (Government Printing Office, 1974), p. 115; quoted in *The Future of Soviet Military Power*, edited by L.L. Whetten (Crane, Russak, 1976).

So, while the Russians were working away at increasing the size of their nuclear arsenal, the United States made no attempt to stay ahead of them, and the number of American missiles and nuclear submarines remained fixed at their 1967 levels. Meanwhile the Soviet military budget continued to climb. It went up steadily, 4 percent a year, year after year. At the same time, the American defense budget, exclusive of Vietnam, began to decline. In 1970, the two budgets crossed—one going up, and the other going down. Still the Soviet budget continued to increase, especially in the area of strategic forces—nuclear bombs, missiles, and submarines—where the Soviets spent about $40 billion a year, while American expenditures in this critical area of defense averaged about $12 billion a year.

By 1969 or 1970, the effects of the massive Soviet buildup were becoming apparent. In round numbers, the Soviet Union now had 1,400 ICBMs plus another 300 nuclear missiles in submarines. Meanwhile, the U.S. strategic forces remained frozen at their 1967 levels of 1,054 ICBMs and 656 nuclear-submarine missiles. Soviet superiority in ICBMs was roughly balanced by our edge in submarine-launched missiles. (We still had a fleet of aging B-52 bombers, but their usefulness against the massive Soviet air defenses was open to question.) Overall the Russians were about equal to us in nuclear destructive power.

Now both sides met the requirements for Mutual Assured Destruction. Each possessed enough weapons to inflict serious damage on the other fellow, and to American strategists, any further buildup by either nation would have been pointless. All that remained was to sit down with the Russians and formalize the arrangement with an arms-control treaty. SALT—the Strategic Arms Limitation Talks—was the result.

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SALT, ratified in 1972, did not actually limit the number of nuclear bombs in the American and Russian arsenals. What it limited was objects that carry bombs, such as missile silos and nuclear submarines. A missile silo, as Senator Moynihan has pointed out, is a hole in the ground, and it can hurt you if you fall into it, but otherwise it is harmless. A true arms-control treaty should have limited the number and size of the nuclear weapons in the arsenals of the two countries. But the United States was never able to get the Soviet Union to agree to anything like that; the Russians would only accept a limit on items such as the number of holes in the ground.

Even so, the Russians found it difficult to live by the terms of the treaty after they signed it. Some years ago, for example, our satellites caught them in the act of digging 150 extra missile silos that were not permitted by the SALT treaty. When the United States brought this matter to the attention of the Russians, they explained that the new holes were launch-control silos, intended to house the crews and equipment which launched the missiles. But the extra silos had special doors of the kind that pop open to permit a missile's quick escape. A silo with a pop-up door is essential for launching missiles, but highly undesirable for housing the launch-control crew, which usually is housed in an underground bunker to protect it from radiation and other effects of nuclear attack. Whatever use the additional silos might be put to initially, it was obvious that they were meant to be convertible to missile silos at a moment's notice.

Specialists monitoring Soviet compliance with the SALT treaty have reported many other violations. Some are ominous because they indicate a serious intent to deceive the United States. For example, former Secretary of Defense Melvin Laird reported in 1977 that the Soviets had gone to great lengths to conceal from our satellite cameras their operations with the SS-16, a new Soviet ICBM.

Unlike our strategic missiles, the SS-16 is mobile. American satellites discovered signs that SS-16s were being moved about under cover of darkness, concealed in wooded areas, and tested on ranges partly covered with camouflage netting. As a result, Secretary Laird said, we could not be sure whether the Russians were producing SS-16s merely in numbers sufficient to replace older missiles, as the 1972 SALT treaty allows, or enlarging their missile force illicitly beyond the number permitted by SALT. All we knew was that by "elaborate concealment" the Soviet Union had deliberately interfered with the means of verifying compliance with the SALT treaty, which was itself a flagrant violation of the treaty.

Secretary Laird also reported that when the Soviets were testing their SS-20 missile—the medium-range missile that has been deployed in large numbers in Russia and aimed against targets in Western Europe—they scrambled or coded the radio signals which are normally transmitted from the missile to the ground during a test flight so that missile experts can monitor the missile's performance. Because the signals were coded, United States' experts could not decipher them to determine the characteristics of the SS-20s.

When the experts finally were able to break the code, they concluded that the SS-20 missiles had been tested with a ton of ballast aboard. This ballast, replaced by fuel, would increase the range of the SS-20 and enable it to attack targets in the United States. In effect the Soviet Union has constructed a dual-use missile that can be aimed either at Western Europe or the U.S., yet its numbers are not counted in the limit on Soviet ICBMs set by the SALT treaty.

The scrambling of the SS-20 radio signals was a particularly cynical violation of SALT on the part of the Soviet Union, because it struck at the very heart of the treaty—the promise by each side that it would not interfere with the other side's "national means of verification."

How did our Government handle Soviet violations of the SALT treaty? Senator Edward Zorinsky brought that point up during Senate hearings on SALT II in 1979 when he asked Paul Nitze: "Do you know of any SALT violations that were not resolved...?" Nitze replied: "No; but how were they resolved? They were resolved by [our side's] accepting what had been done in violation."

SALT treaty or no, the Soviet Union continued to outspend the United States by a wide margin on bombs and missiles throughout the 1970s. The United States budget for strategic forces—bombs, missiles, bombers, and submarines—went down under the Nixon, Ford, and Carter Administrations, and reached a low point of about $9 billion in 1979, at which time it was three-tenths of 1 percent of our Gross National Product. Meanwhile, Russian spending on missiles and bombs continued at a level of about $40 billion a year. By that time, the Soviet Union had spent about $1 trillion on nuclear weapons.

These numbers belie the "action-reaction" theory of the arms race, which holds that the Soviet military buildup is always a response to increases in American defense spending. As Defense Secretary Brown said: "As our defense budgets have risen, the Soviets' have risen. As our defense budgets have gone down, the Soviets' have risen."

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Now the time is 1983. The Russians have been outspending us on nuclear weapons since the 1960s. In President Reagan's Administration the budget for strategic forces has risen, but not enough to make up for two decades of massive Soviet weapons construction. The Soviet Union is building 150 to 200 ICBMs a year, and we are building none. They are constructing several nuclear-missile submarines a year, and we have retired old submarines faster than we have added new ones, so that the number of submarine-launched missiles in the U.S. arsenal has actually declined.

The result is that the destructive power of the Soviet nuclear arsenal is now more than twice as great as that of the United States. The missile forces of the Soviet Union also have a combination of accuracy, destructive power, and numbers that will enable them to destroy most of our Minuteman missiles in their silos in a preemptive first strike. We lack any such capability. In other words, the Soviet Union has strategic superiority.

But does it matter? As Secretary of State Henry Kissinger once asked: "What in the name of God is strategic superiority ?... What do you do with it?" The American strategic-nuclear arsenal, divided into the population of the world, is equivalent to a half ton of TNT per person. The Soviet strategic-nuclear arsenal is equivalent to two tons of TNT per person. Nothing seems to demonstrate the folly of building additional bombs and missiles more clearly than these numbers. By any reasonable criterion, both the United States and the Soviet Union have acquired "overkill."

But the reasoning that leads to the idea of overkill, like the reasoning that leads to Mutual Assured Destruction, is based on an assumption. This assumption, again, has turned out to be false. The assumption is that the bombs of the Russians and of the Americans will be exploded over cities. This is what is meant by holding the civilian population hostage. The Russians, however, have made it plain that they find no merit in this idea. In their planning, the top-priority targets are not our cities but our missile silos, bombers, and submarines—and the communication links which would carry the orders for attack to their commanders. In other words, the Soviets aim to prevent us—in the event war should break out—from inflicting damage on their country.

How would the Soviet Union accomplish that objective? Civilian defense, air defense, and missile defense are part of the answer, and the Soviets have large programs in each of these areas. Civil defense is a fifth arm of the Soviet military, with status equal to that of the Soviet Strategic Rocket Forces, Air Force, Army, and Navy.

Another part of the answer is the 5,000 warheads on Soviet ICBMs. It is true that a small fraction of that huge arsenal could destroy every major city in the United States, but the warheads are not intended for that purpose; they are targeted against our 1,054 missile silos, probably two to a silo. This redundancy will insure nearly complete destruction of the American missile force, even when allowance is made for the fact that some Soviet missiles will not get off the ground, others will wander off course, and some will fail to explode.

Thus, the targeted American missile force accounts for approximately 2,000 of the 5,000 Soviet ICBM warheads. Another 500 warheads could be targeted on military airfields and whatever nuclear-missile submarines are in port or can be located. An additional 500 warheads could be allotted to the destruction of our military command-and-control centers and our military-communication links, with the aim of compromising the system by which instructions flow from the President and senior officials to military commanders in the field for the launch of a retaliatory strike on the Soviet Union.

This would leave a force of 2,000 ICBM warheads still available to the Soviet Union for use in deterring the United States from launching a retaliatory second strike with the ICBMs, bombers, or submarine missiles that had survived the first strike. If our Government failed to see the wisdom of submission at this stage, and launched a retaliatory strike against Soviet cities, Russian reprisal would be swift and devastating, and the life of our nation would be ended.

What about our nuclear submarines? A great many Americans feel that submarines will be the ultimate deterrent to Soviet attack, regardless of the number of ICBMs in the Soviet arsenal. American Trident submarines are nearly invulnerable to detection when at sea, and, as President Carter once pointed out, the nuclear warheads carried on a single one of these would be sufficient to destroy all the largest cities in the Soviet Union.

The difficulty with this line of thinking is that missiles launched from submarines can only be used to attack cities and similar "soft" targets. The reason is that a submarine never knows precisely where it is in the ocean. Although the path of the submarine-launched missile may be very accurately guided during its flight, if the starting point of the missile's trajectory is uncertain, the place where it lands must be equally uncertain. As a consequence, the accuracy of submarine-launched missiles is relatively poor.

American submarines and their missiles therefore cannot be used to eliminate the missile force of the Soviet Union, or its command-and-control centers, because those targets, hardened with reinforced concrete and underground construction, can be destroyed only by the pinpoint accuracy of a direct hit. (An attack on cities does not require great accuracy, since the power of the nuclear weapon will destroy a city if the bomb explodes anywhere in the vicinity.)

These considerations indicate why American submarines cannot substitute for our force of Minutemen, as a deterrent to Soviet attack. From the limited accuracy of submarine-launched missiles it follows that these missiles can only be used against cities. Therefore they cannot be used at all, because our Government will know that if used in this way, they will trigger a punishing Soviet counterattack on our own cities. What President would decide to launch our submarine missiles in an attack on Leningrad and Moscow, knowing that New York and Washington would be destroyed in return? Faced with this option, any government would prefer to live and fight another day.

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In the course of time, technology will improve the accuracy of our submarine-launched nuclear missiles to the point where they will have a hard-target "kill" capability, and the American deterrent will be restored. According to present estimates, that should happen by the end of the 1980s. The intervening four to five years will be, as Dr. Kissinger has said, "a period of vulnerability such as we have not experienced since the early days of the Republic."

If the nuclear-freeze movement is successful, the period of vulnerability will be extended into the 1990s. Assuming that does not happen, how will the Russians make use of the four to five years of nuclear superiority they will still enjoy?

The Persian Gulf is the most likely target of a Soviet move. Imagine a Soviet-instigated outbreak of violence in Saudi Arabia, with American businessmen taken hostage, and a pro-Soviet regime installed, backed by Russian guns and Cuban mercenaries. With a substantial part of the oil flow to Western Europe under Soviet control, and the Middle East in upheaval, the United States will be tempted to intervene with conventional forces. If the Soviets respond by sending in their own troops, and conventional war breaks out, we cannot prevail. The U.S.S.R. has constructed five airfields in southern Afghanistan, bringing the Persian Gulf within range of its fighter aircraft. The Soviet navy heavily outnumbers the American navy in surface ships and attack submarines. As a consequence, we will probably not be able to maintain our supply lines to the Gulf and the Mediterranean and simultaneously protect our sea lines in Atlantic and Asian waters. Defeat will be almost certain.

Could we threaten to escalate to the nuclear level? Only this threat could hope to save us from defeat in the Persian Gulf. But now the Soviet superiority in nuclear weapons becomes the decisive factor. The United States has gone on a nuclear alert three times in the past—in 1948 in the Berlin crisis, in 1962 in the Cuban missile crisis, and in 1973 when the Russians threatened to intervene in the war between Egypt and Israel. We prevailed in each confrontation. In the first two cases we had strategic superiority, and in the third a rough parity. Today, this is no longer true. We would not dare to threaten the use of our nuclear weapons, because of the circumstances I have described.

What about a Soviet move into Western Europe? In Europe, the superiority of conventional Soviet forces would be overwhelming: approximately 45,000 tanks on the Soviet side against 17,000 in NATO; a Soviet superiority of two to one in aircraft, two to one in artillery, and three to one in missile launchers. NATO forces would not be able to withstand a massive Soviet thrust into Western Europe.

But a direct attack would not be necessary. Threats, accompanied by a general escalation of tension, would probably suffice to bring all of Western Europe under Soviet hegemony. Aleksandr Solzhenitsyn has described how it would happen:

> At one time there was no comparison between the strength of the U.S.S.R. and yours. Then it became equal.... Perhaps today it is just greater than balance, but soon it will be two to one. Then three to one. Finally it will be five to one. With... such a nuclear superiority it will be possible to block the use of your weapons, and on some unlucky morning they will declare: "Attention. We're marching our troops to Europe, and if you make a move, we will annihilate you." And this ratio of three to one, of five to one, will have its effect: you will not make a move.

Twenty years ago, or even 10 years ago, the American nuclear arsenal would have been sufficient to deter a Soviet attack on Western Europe, but that is no longer the case.

When will the Russians make their move? Leonid Brezhnev supplied the timetable a few years ago, in a speech to Communist leaders in Prague:

> We are achieving with détente what our predecessors have been unable to achieve using the fist.... By 1985,...we will have achieved most of our objectives in Western Europe... Come 1985, we will be able to extend our will wherever we need to....

And so we finally see why strategic superiority matters. We see how it is that, as Senator Moynihan has said, he who can blow the world up three times has more power than he who can blow it up only twice. □

Soviet-American Arms Control Negotiations

By NILS H. WESSELL

"Even if the nuclear freeze were somehow verifiable," comments the author, "it would diminish international security and crisis stability.... Despite rigorous criticism of the United States negotiating positions at the START and INF talks, international stability is more likely to be advanced by sensible compromises than by ill-advised public initiatives that have the effect of disarming American negotiators." Nils H. Wessell is the director of Foreign Policy Research Institute, Philadelphia.

SINCE the advent of the nuclear age the United States has been involved in a wide variety of arms control negotiations, several of which have led to significant bilateral or multilateral treaties limiting strategic nuclear weaponry.[1] Although such treaties are recent, precedent for them extends as far back as 1817, when the United States and Britain concluded the Rush-Bagot agreement setting strict ceilings on the deployment of their naval forces on the Great Lakes and Lake Champlain. Later, at the turn of the century, the ill-fated Czar Nicholas II took the initiative in convening international peace conferences in The Hague that won broad agreement to ban the use of poison gas, dum-dum bullets, and other advanced technologies of the day like balloon-launched bombs.

To the generation born at the end of the 19th century, the development, testing, deployment and use in World War I of such perversions of science as the tank, the submarine, the airplane and poison gas seemed to pose a unique and revolutionary threat to the well-being of mankind. Technology evidently has been fueling the arms race and outrunning the capabilities of diplomacy over a very long historical period.

In 1946, only months after the United States had demonstrated its capability in atomic weapons, Bernard Baruch unveiled a dramatic, if ultimately futile, plan to invest an international authority with the exclusive right to own or control all present and future atomic energy capabilities. Acting as the United States representative to the United Nations Atomic Energy Commission (AEC), the financier proposed the destruction of all nuclear weapons, an act of renunciation that would have ended the United States atomic mo-

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[1] For the texts of United States arms control agreements, see *Arms Control and Disarmament Agreements: Texts and Histories of Negotiations* (Washington, D.C.: United States Arms Control and Disarmament Agency, 1982).

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nopoly. Despite overwhelming support from United Nations members, the plan failed, running aground on the opposition of the Soviet Union, which objected to verification provisions and the prospect of a freeze on the development of its own nuclear know-how. Three years later, the Soviet Union conducted its first nuclear test, shocking a complacent American public confident of United States' technological superiority. The experience would be repeated in 1957, when the Soviets demonstrated their superior delivery-system technology, boosting an artificial satellite into earth orbit. The years thereafter witnessed a rash of proposals, especially from the Soviet Union, for "general and complete disarmament"; the very comprehensiveness of these proposals was made possible by the unlikelihood of their adoption.

Not surprisingly, perhaps, the first arms limitation treaty after 1945 banned an activity no one contemplated in a place no one inhabited. The Antarctic Treaty (1959) prohibited the militarization of the South Pole. It became a precedent for similar "non-armament" treaties outlawing nuclear weapons in outer space (1967), in Latin America (1968), and on the seabed (1972). The successful conclusion of these agreements suggests a general principle of arms control: the more remote the military threat, the easier its limitation. Thus the Outer Space Treaty outlaws military maneuvers on the moon, where, even if they took place, no country's vital interests would be threatened. Similarly, the United States and the Soviet Union agreed in 1978 to ban the hostile use of environmental modification techniques. Under the treaty the parties pledge to refrain from changing climatic patterns, ocean currents, the ozone layer or the ecological balance for hostile purposes.

In the case of the Treaty of Tlatelolco and its protocols (given impetus by the Cuban missile crisis), the one Latin American state that the historical record suggested was most likely to serve as a launchpoint for nuclear weapons —Cuba—has refused to sign. But the treaty creating a Latin American nuclear free zone created a regional precedent for a global nonproliferation accord signed later that year.

The Non-Proliferation Treaty (NPT), signed in 1968 by the United States, the Soviet Union and Great Britain, came four years after China became the fifth nuclear weapon state. Although the NPT has effectively reinforced other political-military considerations that have thus far deterred any signatory state from testing a nuclear weapon, nonsignatories like India, Israel and the Republic of South Africa have either tested a nuclear device or assembled all the parts necessary for such an explosion.[2] Even universal adherence to a Comprehensive Test Ban Treaty[3] would fail to prevent the near-nuclear states from developing, producing and stockpiling nuclear weapons up to the testing stage. Safeguards developed by the International Atomic Energy Agency (IAEA) in Vienna and applied to nonnuclear signatories, however, have sought to prevent plutonium from being diverted from nuclear power reactors to weapons use.

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[2] Walter Schutze, "A World of Many Nuclear Powers," in Franklyn Griffiths and John C. Polanyi, eds., *The Dangers of Nuclear War* (Toronto: University of Toronto Press, 1979).

[3] United States agreement to the treaty has been blocked by the doubts of the Joint Chiefs of Staff over both the merits and verifiability of an accord and by the Soviet invasion of Afghanistan.

Although a comprehensive test ban continues to elude international agreement, thereby undercutting efforts to limit nuclear proliferation, significant limits on testing have been negotiated and, when convenient, ignored. For two decades, the Limited Test Ban Treaty (1963) has prohibited nuclear explosions in three environments: in outer space, under water and, most critically in light of the radioactive fallout created by nuclear tests at the time, in the atmosphere. Although 123 countries have ratified or signed this important accord, France and China have refused to sign. The test limitation was further strengthened by the Threshold Test Ban Treaty (TTBT) signed in 1974 (not yet ratified by the United States) and the companion treaty governing peaceful nuclear explosions (PNEs), signed in 1976. Under the TTBT, which the United States and the Soviet Union have pledged to observe, the United States and Soviet Union may not test nuclear weapons underground having a yield above 150 kilotons, a level high enough to permit testing of the relatively small MIRV (multiple, independently-targeted reentry vehicle) warheads planned for the Trident II missile and the MX missile.

Moreover, since 1974, the Soviet Union has conducted several tests above the 150-kiloton limit.[4] The PNE treaty, committing the two countries not to conduct nuclear explosions above this yield at locations removed from weapon test sites, includes provision for verification by on-site inspection in the event of a group explosion the aggregate of which exceeds 150 kilotons. The treaty, accordingly, may mark a significant step by the Soviet Union in the direction of accepting increasingly "cooperative" means of verifying arms control accords.

Chemical and Biological Weapons

Chemical and biological warfare agents represent an area where arms control efforts would superficially seem to have been successful. The 1925 Geneva Protocol outlaws the use of chemical and biological weapons in war, and the 1972 Biological and Toxin Weapons Convention, ratified by both superpowers, bans the development, production, stockpiling or acquisition of both biological agents and toxins (substances acting like chemicals but produced by biological processes). Moreover, since 1976 the United States and the Soviet Union have been negotiating at the United Nations Committee on Disarmament on an accord to prohibit the development, production, stockpiling and transfer of chemical warfare agents and have reached substantial agreement. But in the absence of agreement on the verification of destruction of stockpiles and production facilities, no treaty has been signed. (In February 1983, the Administration of President Ronald Reagan submitted a detailed outline for such a treaty.)

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[4] A charge made by Robert T. Grey, then Acting Deputy Director, U.S. Arms Control and Disarmament Agency in Alan F. Neidle, ed., *Nuclear Negotiations: Reassessing Arms Control Goals in U.S.-Soviet Relations* (Austin: University of Texas, 1982), p.79. For another view, see *Scientific American*, October, 1982, p.47ff and *The New Times*, March 8, 1983, p.C1.

Unfortunately, the entire array of international restraints in this area has been undermined by overwhelming evidence that the Soviet Union and its allies have been making widespread use of chemical and toxin weapons in Afghanistan, Laos and Kampuchea in direct violation of both the Geneva Protocol and the 1972 Biological and Toxin Weapons Convention.[5] Afghan refugees and defecting Soviet soldiers stationed in Afghanistan have reported that chemical warfare units are to be found throughout that occupied country. One hundred percent lethal, flesh-softening toxic agents and other deadly chemical compounds have been sprayed indiscriminately from airplanes and delivered by rockets and artillery against resistance forces and even presumed sympathetic civilian settlements. Direct physical evidence has confirmed these reports.

The outbreak of an epidemic of fatal anthrax outside Sverdlovsk in April 1979, that was probably caused by an explosion at a germ warfare factory rather than by tainted meat (as claimed by the Soviet Union), has deepened suspicions that the Kremlin has long been in flagrant violation of the 1972 Biological Weapons Convention.[6] Not unexpectedly, the result has been to call into question the Soviet Union's good faith as a negotiating partner in all areas of arms control where means of verification are less than ironclad.

In a less controversial area, that of rapid and dependable communication between Soviet and American leaders to reduce the risk of nuclear war by accident or miscalculation, results have been easier to achieve. Prompted by the October 1962 confrontation over the clandestine installation of Soviet missiles in Cuba, Washington and Moscow signed a memorandum eight months later establishing a direct communications link involving two terminal points with teletype machines and 24-hour-a-day duplex wire telegraph and radiotelegraph circuits. The original "hot line" understanding was revised in 1971 in the course of the first Strategic Arms Limitation Treaty (SALT) talks to provide for two satellite communications circuits that became operational seven years later.

Also in 1971, the superpowers concluded the Agreement on Measures to Reduce the Risk of Outbreak of Nuclear War, requiring each side to improve technical safeguards against the unauthorized or accidental use of nuclear weapons. Each state committed itself to giving advance notification of plans to launch any missile in the other's direction and to warn the other in event of incidents such as the apparent detection by early warning systems of incoming missiles that might lead to a nuclear exchange.

On the political level, President Richard M. Nixon and General Secretary Leonid I. Brezhnev further pledged in the 1973 Agreement on the Prevention of Nuclear War that they would

> act in such a manner as to prevent the development of situations capable of causing a dangerous exacerbation of their relations, as to avoid military confrontations, and as to exclude the outbreak of nuclear war....

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[5] United States, Department of State, *Chemical Warfare in Southeast Asia and Afghanistan: An Update.* Report from Secretary of State George P. Shultz, November, 1982.

[6] Leslie Gelb, "Mystery of Soviet Anthrax Epidemic Could Hinder Future Arms Control Talks," *International Herald Tribune*, December 3, 1981.

This general declaration was supplemented by a mutual commitment to "refrain from the threat or use of force against the other Party, against the allies of the other Party and against other countries, in circumstances which may endanger international peace and security." If the risk of nuclear war were to arise in these contexts, Washington and Moscow were to undertake "urgent consultations." Signed in June 1973, these general declarations of intent together with those in the Basic Principles of Relations, signed at the 1972 Moscow Summit, were inevitably ignored when the Soviet Union's Arab allies attacked Israel in the Yom Kippur War four months later.

At this time, two sets of multilateral East-West negotiations were initiated, aiming at the political and military stabilization of Europe. Preparations were begun for the Conference on Security and Cooperation in Europe (CSCE), as a result of which the heads of state signed the Helsinki accords in 1975. These accords confirmed Europe's postwar boundaries and called for a freer flow of information and people across national boundaries. The Helsinki Final Act also provided for such confidence-building measures of an arms control nature as prior notification of major military maneuvers. Large-scale Soviet military maneuvers in and around Poland in 1981 and the Soviet-instigated imposition of martial law in Poland in December 1981, directly violated these provisions.

The second multilateral talks on Mutual and Balanced Force Reductions (MBFR) in Central Europe, have dragged on for a decade in Vienna without final agreement. Both the North Atlantic Treaty Organization (NATO) and Warsaw Pact countries have agreed that conventional force reductions should result in a common ceiling of 900,000 troops on each side, no more than 70,000 of which would be ground forces. But the Soviet Union, arguing that the Warsaw Pact deploys only 805,000 ground troops on the Central Front rather than the 960,000 estimated by NATO, contends it can reach the ceiling by making smaller reductions than NATO insists on. If the data base problem could be resolved, an MBFR agreement would likely come quickly. In the meantime each side offers smaller pullbacks.

Although collectively these Soviet-American understandings constitute an impressive body of agreed principles and practices (the record of observance aside), the SALT I agreements limiting offensive nuclear arms and defensive missile systems represent the most far-reaching set of arms restraints ever to go into force. Soviet participation in the SALT talks, initiated in 1969 after the briefest of delays caused by the Warsaw Pact invasion and occupation of Czechoslovakia, was probably motivated by Moscow's desire to achieve several ambitious objectives: 1) to slow the modernization of United States forces, especially to prevent large-scale ABM (anti-ballistic missile) deployments; 2) to codify strategic parity with the United States and win international recognition of its equal status as a superpower; 3) to promote détente as a means of acquiring access to Western (especially American) technology, credits and agricultural products; 4) to offset the incipient United States accommodation with the People's Republic of China; and 5) to reduce the uncertainties and hazards born of an arms race with a technologically and economically superior adversary.

As for the Americans, the Administrations of Presidents Lyndon Johnson and Richard Nixon initiated the SALT negotiations in response to the American need to brake the momentum of the Soviet strategic buildup, even then massive in quantitative terms. They also sought at SALT to alleviate the political and economic pressures generated by continued United States involvement in the Vietnam War. Both parties probably tried also to reduce the prospects of nuclear confrontation caused by an unrestrained arms race.

One of two parts of SALT I, the Interim Agreement limiting offensive arms froze the number of fixed, land-based ICBM (inter-continental ballistic missile) launchers at existing levels, 1,054 for the United States and 1,618 for the Soviet Union (a number the Soviets refused to confirm or deny). Again quantitatively advantaged, Moscow was permitted 950 SLBM (submarine-launched ballistic missile) launchers on 62 submarines while the United States was limited to 710 SLBM launchers on 44 boats. To exercise the option to build up to these levels from then-existing lower numbers, each side had to retire an equal number of ICBMs (an option the Soviet Union fully exercised and the United States did not). As a result, the Interim Agreement codified a nearly 40 percent Soviet numerical advantage in ICBMs and SLBMs. Offsetting this disparity at the time were a larger United States bomber force (bombers were left unregulated) and what turned out ultimately to be a diminishing United States asset of qualitative superiority in such areas as multiple warhead technology and missile accuracy. In light of subsequent negotiations at SALT II and the Intermediate Nuclear Force talks now underway, the Soviet Union appended a Unilateral Statement, rejected by the United States, claiming the right to a larger-than-permitted SLBM force in the even the NATO allies of the United States increased the number of their SLBM submarines beyond then-existing levels. In effect, Moscow claimed the right of compensation for any growth in British and French forces, even though the latter operated independent of the NATO command.

During the two and one-half years of SALT I negotiations, it became clear that the Soviet Union was preoccupied with stopping the deployment of a defensive American ABM system. At one point Moscow, aware that United States' ABM technology could quickly reverse its lead in deployed ABMs, proposed an ABM-only agreement. But the United States insisted on the essential linkage between offensive and defensive limits in view of the momentum of Soviet offensive programs.

The ABM treaty (of unlimited duration in contrast to the five-year term of the Interim Agreement) and the subsequent Protocol adopted in 1974 restricted each country to a single ABM site holding a maximum of 100 interceptor missiles and 100 launchers. Indicative of the effectiveness of this arms control measure, the United States ultimately closed down its only ABM site, and Moscow chose not to expand its relatively crude system of 64 ABMs around Moscow. Associated treaty provisions blocked qualitative improvements in ABM systems by prohibiting the development, testing and deployment of rapid-reload launchers and multiple ABM warheads.

Although some observers had hoped that the ABM treaty would make unnecessary the deployment by each side of vast new offensive systems, the absence in the Interim Agreement of any limits on the development of multiple, independently-targetable reentry vehicles (MIRVs) led to explosive growth in the number of warheads on both sides. SALT I had capped the quantitative arms race but only at the expense of permitting its rechanneling into such qualitative areas as warhead fractionation and guidance improvements. In the future, if ABM systems are developed on new "physical principles" such as directed energy weapons like lasers or charged particle beams, the ABM treaty requires only that limitation of such systems be "discussed." An ABM race remains a possibility.

The SALT Agreements

The SALT I agreements unquestionably made a significant and innovative contribution in the area of verification. By establishing the practice of verification by "national technical means" (NTMs) such as reconnaissance satellites, electronic and radar surveillance, by pledging to avoid concealment measures impeding verification, and by committing themselves not to interfere with each other's surveillance systems, the United States and the Soviet Union provided mutual reassurance with respect to each other's intentions and created a vaulable precedent for future arms control agreements. At the same time, however, Soviet military writers never endorsed the United States strategy of Mutual Assured Destruction, according to which the security of each country would be enhanced by mutual vulnerability, a principle which, if accepted, would tend to restrain the arms race. Still, Soviet willingness to forgo a "thick" defensive system against United States ICBMs and SLBMs suggested an implicit recognition that rote incantations of traditional war-winning doctrines reflected more the need to maintain internal élan than a blueprint for an imminent disarming first strike.

In line with the Interim Agreement's call for continued efforts to limit strategic offensive arms, the SALT II talks began before the ink was dry on the SALT I accords. In fact, broad United States objectives at SALT II were set during Congressional debate on SALT I. The United States Congress, approving the Interim Agreement, appended an amendment offered by Senator Henry M. Jackson (D., Wash.) urging the President

> to seek a future treaty that, inter alia, would not limit the United States to levels of intercontinental strategic forces inferior to the limits provided for the Soviet Union....

The Congress also insisted that a "vigorous research and development and modernization program" was essential to attaining a "more permanent and comprehensive" SALT II treaty.

President Gerald R. Ford, meeting with Brezhnev at Vladivostok in late 1974, won Soviet agreement to the principle of an equal aggregate of 2,400 strategic nuclear delivery vehicles (including bombers in addition to ICBM and SLBM launchers) and an equal aggregate limit of 1,320 on MIRVed launchers. But the two sides continued to disagree on whether the range of the new Soviet Backfire bomber was intercontinental and therefore subject to the ceiling of 2,400 strategic nuclear delivery vehicles (SNDVs). Nor could they agree on the cruise missile, which Moscow sought to ban or limit sharply because United States cruise missile technology was far ahead of its own.

On assuming office in 1977, President Jimmy Carter declared his dissatisfaction with the high level of nuclear arms allowed under this approach and called for more ambitious reductions to 1,800 SNDVs and 1,100 MIRVed launchers. When presented with this suggestion by Secretary of State Cyrus R. Vance in March, Soviet leaders flatly rejected the proposal on grounds that drastic reductions, including a reduction in the number of Soviet heavy missiles and the absence of limits on cruise missiles, would disproportionately advantage the United States. Moscow also rejected the United States fallback offer of an agreement based on the Vladivostok accord, exempting both cruise missiles and Backfire bombers from any limits.

After two years of arduous negotiation, President Carter and General Secretary Brezhnev signed a completed SALT II treaty at the Vienna Summit in June 1979. A complex and detailed agreement to remain in force through 1985, the treaty provided for equal ceilings on SNDVs (2,250 by the end of 1981), an equal aggregate limit of 1,320 MIRVed missile launchers and heavy bombers armed with long-range cruise missiles, an equal sublimit of 1,200 MIRVed missile launchers and a further sublimit of 820 MIRVed ICBM launchers for each side. A limit of 10 warheads per ICBM was designed to constrain Soviet development of a first-strike capability against the United States Minuteman force. Other provisions placed additional restraints on the two sides.

A protocol attached to the treaty, to be effective through 1981, temporarily banned the deployment of mobile ICBM launchers (since they were easy to conceal) and both ground-based and sea-based cruise missile launchers with long ranges (on Soviet insistence)

Although it was the technically and politically impressive culmination of seven years' work, SALT II never came to a ratification vote in the United States Senate. Inherent weaknesses in the treaty, the growing vulnerability of United States ICBMs, and external events conspired in its de facto repudiation. Critics asserted that the treaty would detract from strategic stability. Because the treaty limited launchers instead of missiles, the Soviet Union would be permitted to manufacture and store as many missiles as it wished for later reloading. Opponents also argue that codification of the Soviet monopoly on heavy missiles, which posed the greatest threat to the survivability of Minuteman, failed to curb Soviet first-strike capabilities, permitting the continued undermining of crisis-stability. Limits on the range and production rate of the Soviet Backfire bomber, covered in an exchange of notes, were assailed as insufficient and excessively informal. Several Senators also questioned the verifiability of key provisions affecting limits on missile modernization, fractionation, and throw-weight (weight of the reentry vehicle with its warhead package).

Perhaps more important, the SALT II treaty was submitted to the Senate at a time of growing concern that the Soviet Union had increasingly been able to tip the nuclear balance in its favor and that the treaty would restrain United States counteraction (Soviet leaders asserted that the then-envisioned MX basing mode was disallowed by the treaty) while permitting Moscow to develop an entire new generation of ICBMs.

The sense of public disquiet concerning United States national security policies was powerfully reinforced by the overthrow of the Shah of Iran and the subsequent soaring of oil prices, the helplessness of the United States Government during the prolonged ordeal of American hostages in Iran, the Administration's ability to live with what it had declared to be the "unacceptable" presence of a Soviet "combat brigade" in Cuba and, finally, the Soviet invasion of Afghanistan in December 1979. President Carter remarked that the latter event had given him greater insight into Soviet intentions than any prior experience in his tenure in office, and he withdrew the treaty from Senate consideration.

The Reagan View

President Reagan, who had campaigned against détente in 1976 and against SALT II in 1980, assumed office with an apparently wary attitude toward arms control negotiations with the Soviet Union. The President and his chief aides, agreeing to abide by the terms of SALT II provided the Soviets did so, regarded arms control less as an end in itself than as part of an overall national security policy. Accordingly, they delayed resumption of talks with the Soviet Union for 18 months while winning Congressional support for an ambitious strategic modernization program. The Administration meanwhile devised an entirely new approach to what it termed the Strategic Arms Reduction Talks (START), leaving Soviet leaders to wonder wearily whether the American political process had enough continuity to permit the successful conduct of protracted negotiations.

In May 1982, the Administration announced its START proposal, aimed at achieving sharp reductions rather than freezing present deployments, the alternative first embodied in SALT I and proposed last year by both the Soviet Union and by the American nuclear freeze movement. Other broad United States objectives included mutual but necessarily unequal reductions to equal levels of arms and enhanced security stemming from restraints directed at the most threatening categories of nuclear weapons.

To strengthen deterrence at lower levels of arms, the Administration offered a proposal for a two-stage negotiation, calling in the first instance for cuts in all ballistic missiles (ICBMs and SLBMs) to an equal level approximately one-half the current United States number of about 1,700 (as compared to roughly 2,350 for Moscow). The total number of warheads on those missiles would be cut by at least one-third, to about 5,000 from the roughly 7,500 now deployed by each side. No more than half those warheads would be permitted atop land-based ICBMs, which by virtue of their size and accuracy pose the greatest threat to other land-based systems and so to strategic stability. This sublimit would require the Soviet Union to slash by half the number of its presently deployed ICBM warheads while allowing the United States to increase its ICBM warheads slightly. The United States proposal would apparently call for special reductions in the heaviest Soviet missile, the SS-18, and would freeze bombers at current levels (about 400 for the United States and 350 for the Soviet Union, including the Backfire). Cruise missiles would be unregulated.

In phase two of the negotiations, the United States would seek equal ceilings on missile throw-weight at a level below current United States throw-weight of 4 million pounds (versus Soviet missile throw-weight in excess of 11 million pounds). At this stage, the United States would be prepared to discuss bomber reductions and cruise missile limits.

Soviet negotiators have thus far rejected the United States proposal on the grounds that it exploits the "structural differences" between United States and Soviet nuclear forces, in view of the fact that the Soviet Union deploys 75 percent of its warheads on ICBMs, the United States, only 25 percent. But those weapons are the most destabilizing, and it is apparently the United States intent to persuade Moscow to shift more of its nuclear forces to sea, where smaller and less accurate missiles still pose less of a threat to the other side's land-based forces. Since SLBM submarines are relatively less vulnerable, moreover, strategic stability would be enhanced, because each side could avoid a hair-trigger response to a crisis, including a possibly false warning of an attack. The Soviet Union countered with a proposal for a freeze on the number of deployed weapons during the START talks and the modernization of existing systems, thereby blocking imminent deployment of cruise missiles and possibly blocking the MX, the new Trident II SLBM and the B-1 bomber. Moscow subsequently suggested a START accord imposing an equal ceiling of 1,800 SNDVs (the number proposed five years earlier by Vance and rejected), barring deployment of new intermediate-range missiles in Europe, and setting additional strict limits on all other cruise missiles. Moreover, Moscow suggested adoption of "the best elements" of the SALT II treaty.

The Soviet proposal underscored the connection between the START talks and the negotiations (also in Geneva) on limiting intermediate-range nuclear forces (INF). The INF talks began in November 1981, as a result of a two-track NATO decision in December 1979, to modernize its INF while seeking an arms control agreement with the Soviet Union. To offset Soviet deployment of triple-warhead SS-20 IRBMs (intermediate-range ballistic missiles) able to strike any city in West Europe, NATO agreed to deploy 108 Pershing II missiles and 464 ground-launched cruise missiles (GLCMs) capable of reaching Soviet territory. The NATO deployments, prompted by an initiative advanced by West German Chancellor Helmut Schmidt, are designed to deter Soviet military pressure on West Europe by bringing targets on Soviet territory within range of NATO weapons.

The Soviet Union currently deploys 340 SS-20s, 250 of which are stationed west of the Urals.[7] The 90 east of the Urals may be transported, however, in a few days to launch points against West Europe. Added to the 260 single-warhead SS-4 and SS-5 missiles, the SS-20 force gives Moscow a first-strike force against European targets of 1,300 warheads. NATO presently has no comparable missiles deployed, and its nuclear-armed aircraft, posing only a modest first-strike threat, are vastly outnumbered by corresponding Warsaw

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[7] "Moscow Indicates Easing of Stance on Cuts in Missiles," *The New York Times*, December 12, 1982.

Pact aircraft. Even with the inclusion of British and French nuclear forces (the latter not under NATO command), the Warsaw Pact enjoys a three to one advantage in both delivery vehicles and warheads.

To forestall the NATO deployments, Soviet General Secretary Yuri Andropov has proposed that in return for NATO's agreement not to deploy the planned 572 new missiles the Soviet Union would reduce its force of SS-20s in Europe to 162, the number of British and French missiles. Andropov's gambit, it was later revealed, meant only that the affected SS-20s would be redeployed east of the Urals, from where they could still hit targets in West Europe, not to mention United States' friends and allies in Asia. Even before this clarification, the United States, Britain and France separately rejected the offer. French Président Francois Mitterrand was particularly emphatic in stressing the threat posed by Soviet SS-20s, and his Socialist party's national secretary for international affairs characterized as "total impudence" the warning by Soviet Foreign Minister Andrei A. Gromyko that NATO deployments of Pershing II and ground-launched cruise missiles would increase the chance of war.

The Zero Option

The American proposal, introduced in November 1981, as the "zero option," asked Moscow to dismantle all its 340 SS-20s and 260 SS-4s and SS-5s in return for which NATO would forgo deployment of all 572 Pershing IIs and ground-launched cruise missiles. Although under growing pressure to modify its proposal, especially from a deeply divided West Germany, the Reagan Administration held to the zero option in advance of the West German parliamentary elections March 6. But hints of possible flexibility showed through when it was revealed that United States INF negotiator Paul Nitze had reached an informal agreement with his Soviet counterpart, Yuli Kvitsinsky, the previous summer that called for, among other things, a reduction to 75 SS-20s aimed at Europe together with a freeze at 90 SS-20s in Asia. NATO, for its part, would deploy only 75 GLCMs (with four warheads apiece) and no Pershing IIs, whose six-minute flight time to Soviet targets made Moscow nervous.

Although the Soviet Union repudiated its negotiator and although the plan was never cleared with United States allies as required by protocol and precedent, press reports of a similar rejection by the United States Government may have been exaggerated. Whether agreement can be reached before the initial NATO deployments are scheduled to begin at year's end is uncertain. Demonstrating the military linkage between the START and INF talks, Moscow may be unwilling to make an INF deal until it knows the broad contours of a START accord, because the total threat to Soviet territory cannot otherwise be estimated. For the United States, the two negotiations are linked politically. A START accord without an INF deal might encourage West Europeans to believe that Washington was prepared to export the arms race to Europe. But the imminence of NATO deployments may drive the parties to an INF agreement in advance of START.

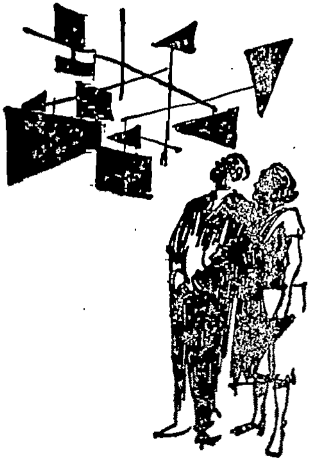
The timetable may also be affected by the spreading activity of the

American and West European nuclear freeze movements. In West Germany, in particular, widespread demonstrations in opposition to any NATO modernization plans may gather strength. Similar movements elsewhere in West Europe may weaken the resolve of NATO governments, leading to no NATO deployments and no Soviet reductions—the least advantageous outcome possible from the standpoint of the European balance of intermediate nuclear forces.

The American nuclear freeze movement is less likely to be as influential. Advocating a verifiable, bilateral freeze on the testing, production and deployment of nuclear weapons (an issue that carried by three to one margins in a series of state and local referendums last fall), the United States freeze movement was based on an impossible objective. In effect, it would require Soviet agreement to allow foreign on-site inspectors to roam at will through every military production factory in a country where access by members of the Soviet Communist party to the newspaper of the French Communist party is considered a threat to national security.

Even if the nuclear freeze were somehow verifiable, it would diminish international security and crisis stability. Applied to Europe, a United States-Soviet freeze would codify a glaring inequality in intermediate-range nuclear forces. This in turn would weaken the security connection between the United States and West Europe, a development to which the American nuclear freeze movement is indifferent.

At the strategic nuclear level, a United States-Soviet freeze would weaken pressure for actual reductions in the most destabilizing American and Soviet weapons systems. But because the Soviet Union deploys more of the most threatening systems, weakening pressure for Soviet arms reduction would be especially dangerous to world security. Despite rigorous criticism of the United States negotiating positions at the START and INF talks, international stability is more likely to be advanced by sensible compromises than by ill-advised public initiatives that have the effect of disarming American negotiators. ☐



Information as a Resource

By HARLAN CLEVELAND

When respected business analyst Peter Drucker calls knowledge in the modern information age "the central capital, the cost center and the crucial resource of the economy," organization managers must "sit up and take notice," says Harlan Cleveland. As a prime resource, however, information does not act according to previous rules that governed *things;* it is generated by the mind, can be shared without being lost and is quickly transported. All these characteristics and more will change the ways of commerce and society around the world.

Harlan Cleveland is director of the Hubert H. Humphrey Institute for Public Affairs at the University of Minnesota, and formerly was U.S. ambassador to NATO.

Where is the wisdom we have lost in knowledge?
Where is the knowledge we have lost in information?
—T.S. Eliot

I will take as given that we need to waste no time describing an information environment that is already part of the conventional wisdom. We are well past the jaw-dropping stage of technological wonder, and have internalized, even if most of us do not really understand, the prospect of millions and millions of transactions in nanoseconds of time. We have also gotten over the notion that "the machine" is bound to swallow up humankind.

Let us also brush quickly past the arguments about vocabulary. However, I want to make clear what I mean by the words I will be using, following the hierarchy suggested long ago by T.S. Eliot.

In my lexicon, *information* is the ore, the sum total of all the facts and ideas, accessible or not, that are available to be known by somebody at a given moment. *Knowledge* is the result of somebody applying the refiner's fire to the mass of facts and ideas, selecting and organizing what is useful to somebody. Most knowledge is expertness—in a field, a subject, a process, a way of thinking, a science, a technology, a system of values, a form of social organization and authority. *Wisdom* is integrated knowledge—information made particularly useful by creating theory rooted in disciplined knowledge but crossing disciplinary lines.

Two colleagues from the University of Minnesota have suggested useful refinements in how we should think about information-as-a-resource. Vernon Ruttan distinguishes between information that can be used or consumed directly, and information embodied in physical objects (new machines, new seeds, new DNA molecules). The implications for economic activity, he suggests, may be quite different for embodied as opposed to disembodied information.

Yi-Fu Tuan organizes the T.S. Eliot hierarchy this way:

"....The difference is one of order of complexity. Information is horizontal, knowledge is structured and hierarchial, wisdom is organismic and flexible. Any diligent student can, with the help of a computerized system, acquire vast amounts of information—for instance, the population of every township in the United States. But the data are pretty useless because they are stretched out at one level. For the data to be useful—come to life, as it were—they have to be linked to another rung or category of data. The result is knowledge. Every teacher knows how difficult it is to pass knowledge, as distinct from information, to students; hence we give objective tests to determine how much information, rather than knowledge, they have acquired. As for imparting wisdom, it...has to do with personal chemistry and slow osmosis."

The size and scope of the transition we are in, the "informatization" of society, is impressive, if still largely impressionistic. A century ago fewer than 10 percent of Americans were doing information work; now more than 50 percent are engaged in it. Today the actual production, extraction or growing of things utilizes less than a quarter of our human resources. The rest are involved in what used to be called "services," of which perhaps two-thirds are information workers. Not only in the United States has the informatization of society proceeded so far so fast. A well-known report by two French Government experts, Simon Nora and Alain Minc, for instance, estimated France's information sector at 45 percent of the labor force five years ago.

None of this is either new or unpredicted. The "human capital" school of economics can trace it back to Adam Smith and Alfred Marshall. For example, agricultural economist G. Edward Schuh says, "All of the increase in agricultural output from the mid-1920s through the mid-1970s came about with no increase in the capital stock of physical resources. It was all due to increases in productivity, with most of that due to new knowledge or information. That makes clear the extent to which knowledge is an input or resource."

What *is* new is the widespread realization that something very important has been happening in full view. When a best-selling philosopher of business administration such as Peter Drucker calls knowledge "the central capital, the cost center and the crucial resource of the economy," nonphilosophers preoccupied with the managing of organizations sit up and take notice.

What is also new is a theory crisis, a sudden sense of having just run out of basic assumptions. We have carried over into our thinking about *information* (which is to say symbols), concepts developed for the management of *things*—concepts such as property, depletion, depreciation, monopoly, market economics and even class struggle. The inherited assumptions are not producing satisfactory growth with acceptable equity. Perhaps we should stop treating information as just another *thing*, and look at what makes it so special.

If information is a resource, it is a very peculiar one. Formerly resources were tangible: minerals, fuel, food. People bought and sold resources, transferred resources to other countries, argued about "sovereignty over national resources," and mobilized resources. People, "human resources," were brought together in organizations to manage *things*, never to manage *information*.

We are accustomed to think of business as centered around resources-as-things. But now the physical component of most business is a small base for an inverted pyramid of organized information. Most business people now work on ideas, procedures, marketing, advertising, administration and on trying to stay out of trouble with consumers, regulators and the law.

By the same token, the American labor movement was initiated by and for people who worked with things. Labor's main power base is still in automobiles, steel, freight transportation, metalworking and other crafts. But today "thing-oriented" work is the province of a dwindling minority of the U.S. labor force. More and more of the organized workers, and the great bulk of the unorganized, are working in services, and most of the service employees are in information work.

If we take seriously the notion that information, through its refined products, knowledge and wisdom, is a "crucial resource," what does that portend for the future? A quick look at the inherent characteristics of information provides clues to the rethinking that lies just ahead.

● Information is alive. Information exists only in the human mind—what it observes, remembers and can retrieve, and what it then analyzes, intuits and integrates. Biological resources are also alive—that's why they are called "renewable." But, like fuel and hard minerals, they exist independently of human perception. Information is the input and output of human perception.

● Information is expandable. Communications lawyer Anne Wells Branscomb calls it "a synergistic resource...the more we have the more we use and the more useful it becomes." Some information is certainly depletive over time. Yesterday's weather forecast is of merely historical interest tomorrow. But for the most part, as sociologists John and Magda McHale pointed out a decade ago, information expands as it is used. Whole industries have grown up to exploit this characteristic of information: scientific research, technology transfer, computer software industry, and agencies for publishing, advertising and public relations.

Because information is expandable without any obvious limits, it tends toward entropy. The facts are never all in; uncertainty is the most important planning factor. The ultimate "limit to growth" of knowledge and wisdom is *time*—time available to human minds for reflection, analysis and integration of information that will be brought to life by being used. The more a society derives its living from information, the more its citizens are caught up in a continual struggle to reduce the information entropy on their desks and in their lives. In the information society, glut is traded for scarcity, flood for drought. To find that a "crucial resource" is not scarce may not make life easier. But it will certainly make life different.

● Information is compressible. Paradoxically, this expandable resource can be concentrated, integrated, summarized—miniaturized, if you will—for easier handling. We can store many complex cases in a theorem, squeeze insights from masses of data into a single formula, capture lessons learned from much practical experience in a manual of procedure.

● Information is substitutable. It can replace capital, labor or physical materials. For example, robotics and automation in factories and offices are displacing, transforming and upgrading the labor force.

- Information is transportable at the speed of light. In less than a century, there has been a major change in both the speed and volume of human activity, a change in transportability of this resource greater than the shift from foot travel to supersonic jet.
- Information is diffusive. It tends to leak, and the more it leaks the more we have. Information is aggressive in striving to break out of unnatural bonds of secrecy in which "thing-minded" people try to imprison it. The straitjackets of public secrecy, intellectual property rights and confidentiality fit very loosely on this restless resource.

The more refined the information (refined into knowledge, integrated into wisdom), the greater its tendency to break out. The information embedded in even the simplest artifact is the ordered representation of some aspect of human experience. Put a brick on the table and it won't leak, but the information embedded in it will. The information, the technology required to make the brick, is a representation of all bricks, and thus carries the knowledge to make other bricks.

- Finally, information is shareable. Communications expert Colin Cherry wrote that information cannot bring about exchange transactions, only shared transactions. *Things* are exchanged: if I give you a flower or sell you my automobile, you have it and I don't. But if I pass on an idea or a fact, we both have it.

In sum, the information resource is different from other resources in fundamental ways, in kind not merely in degree. Therefore it is a mistake to think about information in ways that have proven useful during the centuries when things, with their scarcity, bulk, limited substitutability and transportability, were the dominant resources and prime objects of commerce, politics and prestige.

A society in which information is the dominant resource is not necessarily better or worse, fairer or more exploitative, more or less clean, safer or happier than a society tied to agricultural or industrial resources. The quality, relevance and usefulness of information are not a given. They depend on who uses it, in how refined a form, for what purpose, and by whose lights beneficent or malign. Of course, the information society overlaps, rather than replaces, the older society dependent on tangible things. Indeed, agriculture and industry continue to grow by doing more with less through refined information.

The present impact of information-as-a-resource is already pervasive. The implications for the future are also enormous—for lifestyles, workways, human community and conflict. I believe the implications are especially great for changes in the way we *think* about life, work community and conflict. It is our theories (or assumptions, preconceptions, ideologies, call them what you will) that will arrange the facts and determine how we resolve, for our time and place, the historic social dilemmas—freedom vs. organization, autonomy vs. authority, participation vs. action, growth vs. equity, war or peace.

If our dominant resource is expandable, compressible, substitutable, highly transportable, diffusive and shareable, what becomes of some of our favorite assumptions?

- In accounting, what are we to do with a concept called "depreciation" when a large fraction of our resources does not depreciate with use?

- In economics, why are we still focusing on the allocation of scarcities in the presence of a chronic surplus of information resources?
- In political economy, how are we to adapt the market concept for exchange transactions to the half of our economy that is now sharing transactions?
- In law, how can we pretend that facts and ideas are property when the nonenforcement of copyrights and the obsolescence of patent rights have become a public scandal? Aren't we going to have to invent different ways to reward intellectual labor that are compatible with a sharing environment? And aren't the laws governing privacy and the regulations governing telecommunications already overtaken by technology, which does not wait for legislative hearings or court calendars?
- In psychology and sociology, doesn't the information environment require new ways of thinking about the self, about the family, about the evolution of individual consciousness in the universe of knowledge?
- In education, doesn't the information environment place a much greater premium on integrative thought, educated intuition and ethical hunch? Won't we have to take a new look at a system which awards to the narrowest slices of knowledge the highest credentials for wisdom?

In the information environment, won't we have to rethink the very nature of rule, power and authority? Isn't the information revolution already producing a revolution in the technology of organization?

Information was always the basis of human organization. Those with better or more recent information (generals with their fast couriers, kings with their spies and ambassadors) held sway over others. But once information could be rapidly collected and analyzed, instantly communicated and readily understood by millions, the power monopolies were subject to accelerating erosion, though both the monopolists and their victims often have been slow to perceive it.

Leadership of the uninformed was organized in vertical structures of command and control. Leadership of the informed, requiring wider participation and more collective thought and action, has to be exercised mainly by persuasion—or, in the alternative, by misinformation backed by force.

In a world with nobody in charge but everybody partly in charge, collegial not command structures are the natural basis for organization. In such a management environment, planning cannot be done by a few leaders, advised in secret by experts. Planning has to be dynamic improvisation by the many on a general sense of direction which is announced by leaders only after genuine consultation with those who will have to improvise on it. And more participatory decision-making implies a need for much feedback information. That means more openness, less secrecy—not as an ideological preference but as a technological imperative. In the information society, maybe that is the updated definition of democracy. □

The Rise of American Opera

By PAUL HUME

It was with the arrival in the 1930s of George Gershwin's *Porgy and Bess* and Virgil Thomson's *Four Saints in Three Acts* that American opera came into its own, benefiting from a burgeoning of native talent as well as the gradual weakening of the American composers' dependence on the European tradition. Owing to the achievements of Samuel Barber, Aaron Copland Gian Carlo Menotti, Roger Sessions and, more recently, Leonard Bernstein, Philip Glass and others, says critic and musicologist Paul Hume, there is today in America "an abundance of opera in every musical vein, created by American composers to satisfy the most discriminating audiences." Moreover, increased attention to plot, staging and modern dance is changing the form of opera, blurring the lines between it and serious musical theater. Hume, former professor of music at Georgetown University and music critic of *The Washington Post*, is the author of books on Verdi, Puccini McCormack and Paderewski.

AN impressive number of opera lovers hold that the most beautiful opera yet written by an American composer is *Vanessa* by Samuel Barber, with a libretto by Barber's lifelong friend and colleague, himself one of today's foremost opera composers, Gian Carlo Menotti. Written when Barber was 48, the score won him a Pulitzer Prize. With Dimitri Mitropoulos conducting, *Vanessa's* Metropolitan Opera premiere on January 15, 1958, enjoyed a cast headed by Eleanor Steber, Rosalind Elias, Nicolai Gedda, Giorgio Tozzi and Regina Resnik in the principal roles, and with sumptuous staging and costumes by Cecil Beaton. In that same year *Vanessa* became the first American opera ever performed at the Salzburg Festival. But no opera survives, even with so propitious a beginning, unless its music satisfies the often elusive but essential requirements for lasting success in the lyric theater.

Vanessa was, according to *The New York Times,* "the best American opera ever presented at the stately theater." "Barber's mastery of the operatic language is remarkable and second to none now active on the Salzburg-Milan axis," was the opinion of Paul Henry Lang in the *New York Herald-Tribune,* while *The New Yorker* magazine called the new opera "the finest and most truly 'operatic' opera ever written by an American...." With opinions such as these—and they were echoed by influential critics across the country—a new opera could look forward to a healthy and prosperous future. It could even hope for the rare honor of crossing the Atlantic to be heard in opera theaters that had for centuries been producing the operas that still reigned supreme around the world. With *Vanessa,* American opera reached a new level of artistic and popular success.

It had not been that way before. Despite the richness of America's musical heritage, composed of many traditions and temperaments among the widely different national and cultural groups, creative independence in opera came late. It was only in 1845, in Philadelphia, that the first big romantic opera by an American-born composer was performed. The music was by Philadelphian William Henry Fry, then 31 years old, a man who spent his life working to advance the cause of American composers on all fronts. For a libretto, Fry had his brother Joseph adapt Edward Bulwer-Lytton's novel *The Lady of Lyons,* retitled it *Leonora* and paid for 12 performances.

But big romantic opera in the tradition of Bellini and Donizetti, who were Fry's principal idols, was not the whole story of opera in the United States up to that time. Nearly a decade before the signing of the Declaration of Independence, Philadelphia was the setting for what was to have been the premiere of Andrew Barton's *The Disappointment,* the first ballad opera written by an American composer—if we may call a composer American who was still under the rule of King George III at the time he wrote his opera. For a variety of reasons, stemming largely from the fact that the ballad opera, in the tradition of *The Beggar's Opera,* lampooned various prominent citizens of Philadelphia as well as the government of England, performances of *The Disappointment* were cancelled. Its satirical lines were published and circulated as early as 1767 although the witty piece was not staged until 1976, when it was resurrected as a part of the American Bicentennial.

The story of opera in the United States is almost exclusively a 20th-century matter. The U.S. composers of the late 19th century known as the Boston school spent little of their time on opera, which then as now was expensive to stage and more likely to be presented in the established Italian, French or German productions.

It was however one of the Boston school, Frederick Converse (1871-1940), who had the honor of being the first U.S. composer to have an opera performed at the Metropolitan Opera. On March 18, 1910, *The Pipe of Desire* was given the first of its two performances at the Met from whose repertoire it then disappeared forever. It may be a measure of the unpopularity of the new opera to note that at first it was given as a part of a double bill with *Pagliacci,* while its second and final hearing was in the company of *Cavalleria Risticana* and a Glazunov ballet called *Hungary* that starred Anna Pavlova. *Hungary* received four performances that year to only two for *Pipe.*

It was not until the second decade of this century that American opera composers began to receive anything like regular attention. Then in fairly rapid order operas by Horatio Parker *(Mona),* Charles Wakefield Cadman *(Shanewis),* Victor Herbert *(Natoma* and *Madeleine),* and Reginald De Koven *(Rip Van Winkle)* appeared, if briefly, in the repertoires of the Metropolitan and the opera company in Chicago. Not one of these operas survived more than a season or two, even though they boasted such stars as Mary Garden, Louise Homer and John McCormack. The reasons are not hard to understand: in most cases the music was not sufficiently powerful or lyrically appealing to capture audiences while the librettos were absurdly dated and filled with overripe language.

Over the years, the Metropolitan and the opera company in Chicago valiantly put forward what seemed at the time to be the best operas being written in the United States. Giulio Gatti-Casazza, from 1908 to 1935 the general manager of the Metropolitan, offered his audiences what he was advised were the most promising native operas of their time. Two by Deems Taylor, *The King's Henchman* in 1927 and *Peter Ibbetson* in 1931, were given star-studded performances in the hope that they might prove popular successes. Casts headed by Lucrezia Bori, Edward Johnson and Lawrence Tibbett were the strongest possible bids for the subscribers' approval. Gatti often demonstrated his firm conviction that one of the best ways of selling audiences on new or unfamiliar operas was to cast them as strongly as possible. In her first season at the Metropolitan, along with her appearances in *La Forza del Destino* and *Oberon,* Rosa Ponselle sang the principal soprano role in *The Legend* by Joseph Carl Breil, another opera that rose briefly to the surface and sank into the waves of operatic oblivion after only three performances.

In 1934 Gatti tried again, with *Merry Mount* by Howard Hanson, the world-famous director of the Eastman School of Music at the University of Rochester. Again Lawrence Tibbett used his remarkable vocal and dramatic powers on behalf of opera written in his own country, abetted by Gladys Swarthout and Göta Ljungberg with no less than Tullio Serafin as conductor. But the music suffered because of the inept writing for the solo voices and an insufficient level of inspiration.

The Chicago Opera, on the other hand, was doing its best for *Azora* by Henry Hadley, another of the most prominent composers of the time, for *The Witch of Salem,* a later attempt by Cadman, and for *A Light from St. Agnes* by W. Franke Harling. It is important to realize, incidentally, that it was by no means only American operas that were being tested on U.S. opera stages and found wanting. Season after season some new European imports came and went with the same variously dull thuds.

The American opera scene took on a decidedly new aspect in the 1930s with the arrival of two operas that broke away from the traditional concepts of big, romantic pieces: George Gershwin's *Porgy and Bess* (1935), and Virgil Thomson's *Four Saints in Three Acts* (1934), which gave a new measure of immortality to Gertrude Stein's anything-but-realistic poetry. With staging by John Houseman, choreography by Frederick Ashton and costumes on cellophane, Thomson's opera was sung by an all-Negro cast in English that was so cleanly enunciated that audiences could understand everything that was sung even if they might not always fathom its meaning. There were 60 performances of *Four Saints* in a single year, a record for any American opera up to that time.

One year after the Thomson-Stein hit, and again with an all-Negro cast headed by Todd Duncan, one of the most famous of all American compositions began a life that has continued with few interruptions up to the present time, and which shows every sign of enjoying a vigorous future. This was Gershwin's *Porgy and Bess.* With these two new operas, a strange split surfaced which has, from time to time, seemed to try to divide the American operatic public. This was the habit, begun by some critics in the '30s, of talking about works such as *Porgy and Bess* and *Four Saints* as being musical theater rather than opera.

In the face of "Summertime," "Bess, You Is My Woman Now," "My Man's Gone Now" and "I Got Plenty o' Nuthin'," not to mention the magnificence of the choral writing in such eloquent episodes as the Requiem, it is difficult to imagine the tortured processes by which those critics arrived at their specious conclusions. And it seems likely that, so far as musical criticism is concerned, the line dividing some American operas and musicals will forever remain blurred. But the public, which really did not care too much what some critics called *Porgy*, made the new opera one of their all-time favorites. And so great was its popularity—especially following its notable revival in the early 1950s with Leontyne Price, William Warfield and Cab Calloway when it went to Moscow for a triumphant run—that *Porgy* was one of the kingpins in the still firmly held opinion of some Europeans that Gershwin is the only opera composer the United States has yet turned out.

The '30s and '40s also brought a new and vividly dramatic composer to the American scene: Gian Carlo Menotti. Born in Italy, Menotti has never become an American citizen, but his musical education, aside from some early studies at the Milan Conservatory, took place entirely in the United States. Menotti was 17 when he began to study composition with Rosario Scalero at the Curtis Institute in Philadelphia. By the time he was 22, he had graduated from Curtis, and in 1937 had his first adult opera, *Amelia Goes to the Ball*, performed under one of the most illustrious batons in the world, that of Fritz Reiner. A year later the Metropolitan added the new opera to its repertoire for a time.

For the next 20 years Menotti's most famous scores, and his greatest successes, had their first performances in America. Such familiar and popular favorites as *The Old Maid and the Thief*, *The Medium* and *The Telephone* (often given as a double bill), and *The Consul* all appeared before Menotti's 40th birthday. On Christmas Eve in 1951 the world first saw and heard *Amahl and the Night Visitors*, an opera commissioned by the National Broadcasting Company for television and seen and heard since by more listeners than any other opera in history.

Menotti's roots lie in the fertile ground of Verdi and Puccini. By today, in more than 20 operas, he has achieved a place of permanent fame to which he is richly entitled. *The Consul* won him both a Pulitzer Prize and the New York Drama Critics Award, the latter emphasizing the fact that Menotti has nearly always served as his own librettist, combining his remarkable gifts as writer and composer. Yet some of his operas have been violently attacked by the same purists who cite *Tosca* as a horrible example of the operatic art. Such criticism is easy to dismiss, and at least 8 or 10 of Menotti's operas are likely to remain on the active list for a long time.

The 1930s were a decisive period in the coming-of-age of American composers in many fields. By then enough time had passed for the first generation of postwar composers to have established a strongly American brand of music. Aaron Copland, Roy Harris, William Schuman, Samuel Barber, Virgil Thomson, Howard Hanson and others had broken away in differing ways and to varying extents from the prewar German influence. In many cases, it was the pervasive influence of the great teacher Nadia Boulanger that had brought about the changes.

Even in the face of the Great Depression American music was being performed more often and it no longer seemed so extraordinary to the average citizen that some of his American contemporaries might be writing music of as high quality as any being written anywhere in the world. Gradually American music became popular in opera houses as well. In addition, after World War II Europe was welcoming young American singers to its opera theaters in large numbers—for a number of years there were more than 600 American opera singers in the opera houses of Germany alone. With the spread of opera workshops and departments to many American campuses came the founding of many opera companies smaller than the Metropolitan, the Chicago Lyric or the San Francisco Opera. These companies provided new opportunities not only for American singers but also for American operas.

The economics of opera, however, continued to work against the writing of American operas. Opera is, after all, the most expensive of all the musical arts to produce. It requires not only leading voices but often good singers in secondary roles, an orchestra, sets, costumes, lighting equipment, lengthy rehearsal time and storage space for its physical requirements. And so, precisely as many American composers, disappointed at the difficulties of getting symphony orchestras to play their music, turned to chamber music and other intimate forms, many leading composers spent their creative time writing music they felt had greater chances than opera of reaching audiences.

Even so, there is a long list of operas that have come into existence in America in the past half century. Aaron Copland, whose one-act opera *The Second Hurricane* was written for schoolchildren "and their parents" in the late 1930s, wrote *The Tender Land* a decade and a half later. The most affecting episode of this often touching score, unfortunately, is the moving "The Promise of Living" that closes Act One; nothing that follows quite matches it.

Leonard Bernstein's first opera *Trouble in Tahiti,* produced on Broadway in 1952, was not a success. Thirty years later Bernstein withdrew for a while from his concert and recording activities to give time and energy to the completion of a new opera, intended as a sequel to *Trouble in Tahiti.* Bernstein said recently that *A Quiet Place,* premiered in Houston in 1983, is "far more serious," and probes deeply into the psychological situations in which the characters are placed. The new opera was intended to be another step along the road Bernstein has always hoped American composers would travel in arriving at opera that looks and sounds in every way American. This is the road he traveled in *West Side Story* which really fits more closely into the mood of the "Broadway musical." It is also a road he followed in writing his *Mass.* Along the way, he also composed *Candide,* first produced in 1956 and most recently revised and restaged by the New York City Opera. Although the 1982 production was disappointing to critics, the Bernstein score was called probably his "grandest, wittiest and most sophisticated."

Robert Ward won a Pulitzer Prize for his opera based on Arthur Miller's play *The Crucible* in 1962. Nothing in several operas that have followed has equalled the tension and lyric beauty of that work.

Hopes soared high when Carlisle Floyd came up with *Susannah* in 1955. But his later operas have not lived up to that rich promise, although he did achieve minor success with a monodrama he created for Phyllis Curtin as Eleanor of Aquitaine.

It is difficult to assign any final position to one of the most respected of all American operas, *Montezuma* by Roger Sessions. It was not heard in the United States until 12 years after its world premiere in Germany in 1964. It was Sarah Caldwell, the founder and director of the Opera Company of Boston, who finally gave Sessions' opera the kind of preparation and production it deserved, introducing it to American audiences with a cast headed by Phyllis Bryn-Julson, Donald Gramm and Brent Ellis. But it is not an easy opera to love, and love is one element that must be present if an opera is to succeed with large audiences, different though that love may be for those who want to hear *Wozzeck* or *Pelléas et Mèlisande.*

Today, U.S. opera stages could be covered many times over with American operas in every musical style. Indeed, during a recent season companies in the United States staged 3,653 presentations of American operas, which represented 38 percent of the total for all works. There is for example, Stanley Silverman's experimental *Elephant Steps* whose obscure drama is not greatly helped by its somewhat fragmented score. There is also a lovely setting of Tennessee Williams' diaphanous play *Summer and Smoke,* with music by Lee Hoiby. This is a recent opera that really works: its 1971 premiere at the Minnesota Opera was stronger than the more recent production by the New York City Opera, but Hoiby has caught to a remarkable degree the conflicts, psychological and physical, that mark the unfamiliar drama.

A recent comer to the U.S. operatic scene, a highly innovative one, is Philip Glass, whose *Einstein on the Beach* played in the Metropolitan Opera House in 1976, though not under the Met's aegis. It was followed in the spring of 1982 by his *Satyagraha.* In both works Glass holds to the technique he has made familiar, called "minimalism," a term not intended in any negative sense, but rather as a description of Glass' exploitation of the possibilities of music deliberately held to simple permutations of limited resources. *Einstein on the Beach* lasts longer than any opera by Richard Wagner or Giacomo Meyerbeer, which may have some part in keeping it from frequent performance. *Satyagraha* requires, if Glass' intentions are met, that it be sung in a Hindustani dialect, in keeping with its philosophical message which is Mahatma Gandhi's teaching of "nonviolent resistance."

There are a number of excellent one-act operas by American composers. One of the best has been strangely and consistently neglected: *Lord Byron's Love Letter,* with music by Raffaello de Banfield. And the vigor and western frontier atmosphere of a famous poem are ideally captured in *The Face on the Barroom Floor,* in which composer Henry Mollicone uses Antoine d'Arcy's ballad.

But to return to the full-length opera repertoire, these are some of the real riches in various veins that now exist, any one of which would strongly enhance any company's repertoire: *Six Characters in Search of an Author* by Hugo Weisgall, a work of magnificent pace and variety of mood, based on Pirandello's famous play; *Postcard from Morocco* by Dominick Argento, a score of mesmerizing power when properly staged; *The Ballad of Baby Doe* by Douglas Moore, with music of melting beauty that was made famous by Beverly Sills at her greatest, and which is now being sung with consummate effect by Ruth Welting; *The Sweet Bye and Bye* by Jack Beeson, in which Beeson uses recent evangelistic revivalism to great effect.

George Rochberg, at one time one of the more avant-garde composers in the United States, is today one of a number of composers who have made a conscious decision to write in a manner which they hope will appeal to listeners upon the first hearing of their new music. Rochberg's *The Confidence Man* was given its premiere in the summer of 1982 at Santa Fe.

Mounting costs of production, when combined with a tendency on the part of some opera managements to drop a new opera fast if it does not make a smash hit at its very first presentation, have sometimes kept a potentially fine work from being given anything like a second chance. Perhaps the most famous example of this in recent times was Samuel Barber's *Antony and Cleopatra*, which he was commissioned to write to celebrate the opening of New York's new Metropolitan Opera House in 1966. On opening night the stage machinery broke down so that the elaborate sets had to be moved by hand; the opera was wildly overstaged by Franco Zeffirelli, who was also the librettist. Cruelly roasted after its premiere, the opera was withdrawn and untouched by a somewhat embittered Barber for a number of years. However, he never doubted the rich beauty of the music, and eventually set to work to revise the opera with the result that when it was produced recently at the Juilliard School it was warmly praised.

A similar fate hit *Miss Julie*, an adaption of the Strindberg play with music by Ned Rorem who, with Barber, possesses one of the finest gifts for vocal writing of any American composer. Again, there was a first performance in 1965 that failed to realize the ful potential of the work—how often has that not been the case, as with Puccini's *Butterfly* and Verdi's *Traviata?* Fortunately, 14 years after the ill-fated opening, Rorem and colleagues who believed in the opera presented a revised *Miss Julie* that led the perceptive Peter Davies to write in *The New York Times*, "As sheer music, the score is exceptionally well crafted and often of unusual beauty. The vocal lines are consistently expressive, the orchestral writing is frequently of translucent luminescence, the conversational passages are well paced...."

The evidence is in: there is an abundance of opera in every musical vein, created by American composers, to satisfy the most discriminating opera audiences. More is being written. For example, John Corigliano is composing the first American opera commissioned by the Metropolitan Opera in years as part of the Met's centennial celebration starting in 1983. Some of it will quickly disappear after being tried out a few times. That has been true throughout the whole history of opera. But there is no question that much beautiful opera has come into being thanks to contemporary composers in the United States. □

Pluralism and Fundamentalism in the United States

By NATHAN GLAZER

In this article, sociologist and Harvard University professor Nathan Glazer analyzes the significant growth of religious fundamentalism that has reached all aspects of American life, and suggests it is more an extension of the old than an introduction to the new. Change, once again, Glazer finds, is contained within a broad and deep stream of continuity.

AMERICANS are currently buried in an avalanche of publicity and journalistic commentary, and even a moderate degree of analysis, regarding an upsurge of fundamentalism. They have been told again and again about its potential threat to civil liberties, to a healthy diversity of opinion and to the hope that public affairs can remain free of the divisiveness of religious factionalism.

Of course, Americans have been plagued through most of their history by religious-based conflicts, but the new rising tide of religious issues has nothing to do with traditional Catholic/Protestant, or Jewish/gentile splits and divisions. It rather pits fundamentalist and resurgent traditional Protestantism against liberal Protestantism. Jews and Catholics, both traditional and liberal, are involved—but now not as representatives of embattled faiths, but as citizens, because major public issues have been raised. In terms of current conflicts involving religion, Jews, Catholics and Protestants are no longer the principal combatants, who are rather traditionalists against liberals of whatever religious background.

Some have been caught by surprise, including liberal journalists who have rushed to examine with concern the politically active conservative movement, the Moral Majority, its supporters and those it supports. That is because, I would argue, we have forgotten a great deal of American history. And perhaps even more important, we have ignored a great deal of existent and still potent American reality. The nation has been, if anything, a *religious* republic, and Americans are still, to a surprising degree for the modern, industrialized or postindustrialized world, a *religious* people. And this is also, of course, a law-ridden republic and people, committed to elaborate legal processes to come to conclusions. Finally, paralleling the involvement in religion and the commitment of legal processes, Americans are committed to the market, to the free development of goods and services, which must inevitably undermine anything traditional in society.

What has been happening in recent years is that law and the market have created a situation in which it was inevitable that the more religious elements

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of the population would react with anger and with vigor. They have done so, and put a fright into those who have forgotten the religious past and are ignorant of the nature of the American people in the wide stretch of territory between New York and Los Angeles.

It is worth pointing out that intense religious-based beliefs have often directly inserted themselves into American politics, for good or ill. In an interesting article in *This World* on religious lobbies, political scientist Paul J. Weber recently pointed to two major movements in American life that were fueled primarily by religious sentiment. One was the movement to abolish slavery in the 1800s: while this encompassed a much wider band of American opinion and power than that represented by the clergy of various Protestant denominations, Weber argues that "no other segment of the population pursued the issue with such intensity or tenaciousness. No other groups had the opportunity and facilities to raise consciousness to the extent religious groups did."

Weber's second example is more ambiguous, but still shows the power of religion in American public life: the anti-alcohol movement. Once again, not only religious groups were involved. There were progressive elements who saw in the wiping out of the saloon the salvation of the working man and his family. There was also more than a touch of anti-Catholicism, for Catholics in no way shared the fervor of Protestants, and in particular of the churches of the Protestant lower middle classes, in opposing drink. But at the heart of the movement were the religious groups. The manpower and womanpower, the contributions, the publications, were animated primarily by a religious sentiment, rather than any pragmatic or rational analysis. This was also preeminently a "single-issue" movement, parallel to today's anti-abortion, pro-school prayer and other efforts. And it won. It resulted in the 18th Amendment banning drink, an astonishing victory, which eventually had to be repealed by yet another amendment.

What explains the recent resurgence of the religious Right? It is worth looking at the issues that most agitate them, and asking what has made them issues. One was the Supreme Court decision of 1973 setting standards for state control of abortion—and in the process thrusting aside the abortion laws of 50 states. A second issue is the concern with a rising tide of nontraditional attitudes toward sexual and family roles, and the almost casual references to premarital sex, homosexuality and drug use on television and in the mass media. A third is the Supreme Court's ban on school prayer. In other words, it is the great success of secular and liberal forces, principally operating through the specific agency of the courts, that has in large measure created the issues on which the religious fundamentalists have managed to achieve what influence they have.

This is perhaps a strong statement, but I believe I can defend it. Abortion was not a national issue until the Supreme Court, in 1973, set national standards for state laws. It did not become an issue because fundamentalists wanted to strengthen prohibitions against abortion, but because liberals wanted to abolish them. Equal rights for women did not become an issue because fundamentalists wanted to limit women's rights, but because the proposed

Equal Rights Amendment raised fears, rational and irrational, that all traditional distinctions between men's and women's roles would be overturned. Pornography in the 1980s did not become an issue because fundamentalists wanted to ban D.H. Lawrence, James Joyce or even Henry Miller, but because in the 1960s and 1970s under-the-table pornography moved blatantly to the newsstands. Prayer in the schools did not become an issue because fundamentalists wanted to introduce new prayers or sectarian prayers—but because the Supreme Court ruled against all prayers. Freedom for religious schools became an issue not because of any legal effort to expand their scope—but because various Federal and state authorities tried to impose restrictions on them that private schools had not faced before.

By now perhaps it is hardly relevant who was the original initiator of these issues. But I rehearse this story to make a simple point that is much forgotten in the rising tide of fear of fundamentalist influence: dominant power—measured by money, access to the major media, and the opinion of the educated, moneyed and powerful elites—still rests with the secular and liberal forces that created, through court action, the changes that have aroused fundamentalism. What we are seeing is a defensive reaction of the conservative heartland, rather than an offensive that intends to or is capable of really upsetting the balance, or of driving the United States back to the 19th or early 20th century. The two decisions that have most sharply focused the anger of the heartland date back only to 1963—the school prayer decision, and 1973—the abortion decision.

It is a strange political posture indeed, one in which both sides see themselves embattled and endangered, in which both see themselves as playing a defensive role, protecting some important value or institution against an attack which is upsetting a stable balance. It needs no argument to demonstrate that this is the posture of secular and liberal forces. I merely have to read my mail, which brings frequent appeals for contributions to protect—from the Moral Majority and others—the Constitution, the Supreme Court and individual rights.

But I would argue that this is also the self-image and the posture of the now-resurgent fundamentalist religious forces. They may be on the offensive, but it is, if I may use the phrase, a "defensive offensive," meant to get Americans back to, at worst, the 1950s, and even that is beyond the hopes, or I would think the power, of fundamentalist religion. This "defensive offensive" itself can only be understood as a response to what is seen as aggression—the aggression that banned prayer from the schools, that prevented states from expressing local opinion as to the legitimacy of abortion, and that having driven religion out of the public schools now is seeking to limit the schools that practice it, or to prevent any assistance to the private schools to which many parents—who want a religious atmosphere and a religious education for their children—have now turned.

We are very far, I would argue, from the time when one might have legitimately feared the power of narrow-mindedness and bigotry as embodied in fundamentalist and traditional religion. Not that there is not enough bigotry and narrow-mindedness to be found there, as elsewhere. But I think we must make a distinction between a powerful and self-confident movement that would hope to reshape America in its image, and a defensive one that wants to protect some enclaves for traditional religion. It is not easy to draw the line between one and the other, but I believe what the U.S. faces today is much more the second than the first. Let me give a few reasons why I think so.

First, in an organizational sense, the movement is weaker than its opponents. It is sobering—and will be encouraging for liberals and secularists—to see how weak the major fundamentalist, traditionalist or conservative religious lobbies are in terms of money and manpower and prestige.

Second, the conservative groups are for the most part quite new. The great majority were created in the 1970s. (This is yet another indication that they are defensive, having been launched against the changes of the 1960s and 1970s.) As is true of all new lobbying movements, probably many groups will not survive.

Third, the new conservative religious movements show less bias and bigotry against other religions or minority racial groups than did religious groups in the past. They define as their enemies not Catholics, or Jews, or blacks, but secular liberals who have introduced changes which the fundamentalists believe undermine religion and the family. The new movement is perhaps the first major fundamentalist Protestant movement that is not anti-Catholic. Indeed, it has many interests in common with Catholics, such as opposition to abortion and the concern for the independence of religious schools. It is not anti-Jewish, as evidenced in the interesting exchanges between Jerry Falwell of the Moral Majority and Prime Minister Begin of Israel. The movement is not anti-black.

Indeed, whatever the inevitable caution, quite justified by history, with which Jews and Catholics and blacks view any white Protestant fundamentalist movement, this one is not based on religious or racial bigotry. I believe one reason for this refusal to embrace bigotry is that fundamentalist Protestantism is no longer dominant in the country, and seeks allies everywhere—and they can be found even among conservative Jews, and even among blacks, who are still on the whole more religious than whites, and who share, in a larger degree than white opinion generally, some of the positions of the fundamentalist Protestant movements, such as opposition to abortion.

In any case, I do not find in the issues embraced by the fundamentalist Protestants anything implicitly anti-Catholic, anti-Jewish or anti-black, whatever the degree of these feelings that one may still find among the movement's supporters. When I remarked that they want to push the clock back, at worst, to the 1950s, my point was that they do not envisage pushing it back, as far as I can see, to a time when anti-Catholic, anti-Jewish and anti-black sentiments were endemic and widely accepted. They know a great deal has changed: but they are focusing on only some things, and nothing they say, nothing in their stands on issues, suggests that Catholics, Jews and racial minorities would be anything less than full citizens in the ideal world they envisage.

Fourth, the new fundamentalist movement expresses points of view and attitudes that the dominant mass media—the national newspapers, weeklies, TV networks—for the most part reject, and that dominant elites also reject.

Evangelists' TV audiences are much exaggerated; they do not usually appear on the TV networks or in the national news magazines. It is interesting to compare the attitudes on religion and religious issues of American public opinion generally and elite opinion, as we find in a recent survey of American values. In this survey, 65 percent of the public believed abortion to be morally wrong, only 36 percent of the leaders. Seventy-one percent of the public felt homosexuality to be morally wrong, only 42 percent of the leaders. Fifty-seven percent of the public considered smoking marijuana wrong, only 33 percent of the leaders. And I suspect that if the surveyors had asked, a much greater percentage of the leaders would have supported the Supreme Court on prayer and aid to private schools than would the public. Admittedly, one may draw various conclusions from this division between leaders and general public opinion. One may find the wave of the future in mass public opinion. But that is not the way lines of influence run. I doubt that we are in any danger of being overrun by a religious mob led by fanatical religious leaders.

But my strongest argument for seeing the new movement as defensive and with limited aims is that I believe we saw in the 1960s and 1970s a real revolution, and that what we are seeing now is an attempt at a counterrevolution—but one which, like all counterrevolutions, will have to be satisfied to accept much of the change that has aroused it. The aim of the new movement is basically to protect enclaves of literal, fundamentalist faith and the practices that accompany it. The protection of enclaves is best accomplished, I would argue, not by sweeping national decisions, but by practice and law and custom adapted to the enormous variety of the country. The United States is not one culture but many cultures. The anti-alcohol movement, to take a revealing parallel, went too far when it imposed one section's view of drink on the rest of the country. But when the dispute was finally settled by the repeal of the 18th Amendment, it did not bother most people that in one section of the country or another, one could not get a drink on Sunday. In the same way, liberalism went too far when it imposed on the whole the views of one part of the population regarding abortion, or school prayer, or support for religious schools, through major cases that led to sweeping Supreme Court decisions that set national standards. These major decisions made national issues of what should have been state and local issues, such as abortion and school prayer.

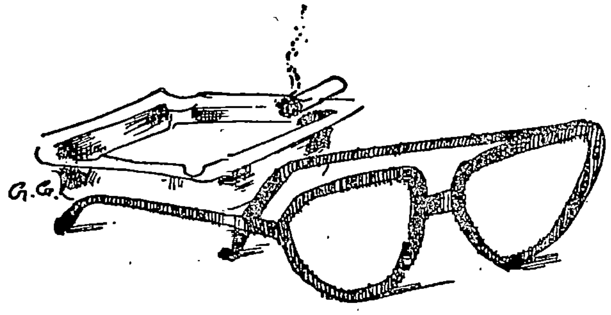
Is there a way out? I think there is. I am reminded that the Supreme Court ruled in 1972 that the Amish (a strict sect of Mennonites) in Wisconsin did not have to send their children to school past the age when they felt education was useful for them. It was not a simple decision. What of the rights of the children who may have wished to continue in school despite their parents' desire to protect them from secular influences past age 14? There are no simple solutions to conflict between overriding principles and minority practices. But this decision did create peace. Others may have the same effect.

The battle lines are now drawn, as my mail pleading for contributions to protect free abortion, free television and the rest daily reminds me. But I think a few modest Supreme Court reversals would do wonders.

Is it possible to define the changes that are necessary to moderate fundamentalist anger, and that may yet be acceptable to the cosmopolitan elite? I would like to suggest a theme for these changes: it is local option in morality, as there is local option in drink. I think local option, by states and communities, on such matters as abortion, Bible reading in schools (one can switch from one translation to the other, and add the Bhagavad-Gita and the Koran as school composition changes), public assistance to private schools and a number of other matters, could do wonders, and would simply and honestly reflect the reality that we are a diverse country. Nor would the U.S. Constitution be violated, even if undoubtedly many professors of constitutional law would be outraged. After all, the constitutional principles that permitted national prohibitions in these areas were found lurking in the Constitution only 180 years after it was adopted.

Fundamentalism is not an anachronistic remnant doomed to disappear rapidly, but neither is the world about to be saved, once and for all. Policy must adapt to this reality. The fundamentalist must recognize that at least half of the people are and will remain skeptical and unsaved; and the secular liberals must accept the fact that even their rational outlook will not gain universal acquiescence.

The arrangements that permit the United States to survive are those in which neither side imposes on the other its vision of the good society. Working out the details is not simple, in a society in which there is no one ruling elite, and any view, no matter how eccentric, may find itself law if it finds the right judge. But I am convinced that if the cosmopolitan elite withdraws from imposing its views on the whole country, the new fundamentalism will return to its modest role in the American kaleidoscope. □



Avoiding the Entropy Trap

By ALVIN M. WEINBERG

Most discussions of the future of industrialized countries focus on the energy crisis, the depletion of resources and the deterioration of the environment. Alvin M. Weinberg tackles these problems but advances a different interpretation and proposes different remedies. For example, while he concedes that the overriding issue today remains oil, he argues that abundant sources of energy still exist and predicts that by the 1990s we will see a renewed interest in nuclear power in all of the developed countries. Physicist Weinberg is director of the Institute for Energy Analysis in Oak Ridge, Tennessee, and coauthor of *Reflections on Big Science.*

THE great debate over the future of Western technological society has been captured by the entropists. These are the Neo-Malthusian disciples of the economist Nicholas Georgescu-Roegen, who in his remarkable book, *The Entropy Law and the Economic Process* (1971), concluded that man's economic transactions inevitably lead to an increase in entropy. Georgescu-Roegen interpreted the word entropy broadly: pollution, dissipation of resources, social disorganization.

Every transaction between man and nature involves energy: the burning of fuel, the winning of metals from their ores or the processing of food. Every such transaction implies an increase in thermodynamic entropy, which manifests itself in a gradual depletion of our endowment of free energy (the fossil fuels) as well as growing pollution: waste heat, or more general deterioration of the environment. This depletion of the fossil fuels is the essence of the Malthusian dilemma.

Georgescu-Roegen more correctly identified the Malthusian dilemma as an increase in entropy; his disciples, such as E.F. Schumacher, Barry Commoner and more recently Europe's Green political parties, have converted these theoretical views into powerful political doctrines.

These doctrines, though correct in principle and in the very long run, have little relevance to the actual state of affairs during the next 20 years. What is described as a vast deterioration of the environment is an illusion. The oil shortage is confounded with a general energy shortage. Nevertheless, the political power mobilized by the entropists has, in the more participatory democracies, tended to make their prophecies self-fulfilling. By denying the society some of the newer energy sources, particularly nuclear, they are setting an entropy trap that could undercut our whole Western humanism.

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No one denies that the entropy trap may ultimately engulf us: the important question is when. Should environmentalism and indiscriminate conservation be the overriding concerns for the next 20 years, particularly for the developed world? Or should other, more mundane issues—such as enhanced recovery of oil, or fixing nuclear energy, or vigorous development of hydroelectricity—command our attention?

The more extreme entropists insist that the whole of modern technology, symbolized most of all by the central nuclear generating power station, represents a wicked aberration because it is centralized, dehumanizing, inefficient, uneconomic. They call for a return to a society based on the widespread use of renewable, decentralized, human and small energy technologies—and a corresponding change in the modes of production away from the centralized factory system to some new configuration that better responds to real human needs. In this plea, the modern entropists hark back to the American social philosopher, Lewis Mumford. In his *Technics and Civilization,* written 50 years ago, Mumford called for a more humane technology and a society that denied growth by limiting consumption.

I believe the entropists have misread our current malady. The remedies they propose—an end to growth and rejection of the centralized electrical technologies—are wrong. Their argument rests on three assumptions:

- We are rapidly running out of fossil fuel, and therefore conservation of energy rather than exploitation of new resources of energy must dominate energy policy.
- Our high-grade mineral resources are being dissipated, and therefore the economic crisis precipitated by OPEC's manipulation of the oil supply will be repeated for many other minerals.
- Our whole technology, particularly our energy technology, is destroying the environment.

To the argument that we are running out of energy generally, I point out that the estimated energy in the coal resource of the world (if not limited by the accumulation of carbon dioxide) is about 6,000 terawatt-years compared to the eight terawatt-years used in the past year. In the uranium and thorium of the oceans and the rocks there is, for all practical purposes, an infinite source of energy that does not release carbon dioxide, provided these materials are used in breeder reactors.

The energy crisis has been largely a shortage of cheap oil. And the high price of oil is not ordained on strictly economic grounds; it was controlled by OPEC. And OPEC was successful because the marginal costs of the newer sources of oil—synthetics from coal or shale—were much higher than the going price of oil when OPEC became effective in 1973.

The price of a barrel of oil from shale in 1990 probably will exceed the real 1973 world price of oil by a factor of about 10 to15. In this respect oil is almost unique: for nearly all of the other most common minerals the difference in price between the current price and the price of more expensive, lower grade and much more extensive resources is far less.

Thus the entropist argument about diminishing resources and dissipated minerals seems greatly exaggerated. What is true for oil is most certainly *not* true for the commonest metals, particularly iron and aluminum. For these most widely used metals there are all but inexhaustible sources at concentrations only a little lower than the average concentrations of ores that are now being mined.

True, the less common though very important minerals, such as chromium or copper or lead, are not available in enormous quantities at prices within a factor of two of current price. They are available, probably in very large amounts, at prices, say 15 times current price. Thus it is not impossible to imagine a cartel that would set the price of copper at a level 15 times higher than the current price, but the impact on the world economy would be far smaller than the impact of the five-fold rise in the real price of oil between 1973 and 1982.

The same applies to most of the other less common minerals: because of their relative economic unimportance and of the possibility of substitution (as well as recycling), the world could sustain a large increase in their price without suffering the serious economic hardship imposed by the enormous run-up in the price of oil. Thus the second argument in the entropists' triad—that the world is about to suffer from catastrophic shortage of nonfuel minerals—seems to falter in the face of the actual numbers.

There are exceptions in principle: phosphorus and the trace metals such as zinc and cobalt are indispensable for living matter, and there are no substitutes for them. Nevertheless, the higher grade phosphate deposits are enormous, the ratio of known resources to annual consumption being around 1,000. And the amount of trace minerals needed per hectare is so small as to push the time of real shortage far into the future. Should society begin to "run-out" of phosphorus, we can expect to recycle, to develop efficient ways of applying these materials to plants, and to exploit lower grade deposits. But the time for this is centuries, not decades, away.

Nor can we accept the third claim: that the environment is in danger of imminent collapse. If it were in such awful shape, then we should be seeing a serious increase in mortality from cancer, the disease that is often regarded as resulting from exposure to a noxious environment. But U.S. life expectancy gained 2.5 years from 1970 to 1978 compared with a gain of 0.8 years in the entire decade of the 1960s. And except for the increase in lung cancer (which is probably caused by cigarette smoking) the overall age-adjusted cancer mortality has risen very slightly, if at all, in the past decade. The increase in mortality from lung cancer has been offset to a considerable degree by an unexplained reduction in mortality from stomach cancer. We are *not* suffering from a cancer epidemic; insofar as environmentalist concerns are based on such perceptions, they are misleading.

I do not claim that there are no valid environmental concerns. As was true in 1554 when Georgius Agricola wrote *De Re Metallica,* mining of whatever kind despoils the environment—though mainly in the environs of the mine. The internal combustion engine certainly has caused smog in many large cities; and in various local situations industrial effluents have polluted the water. The loss of top soil, amounting to about one centimeter per decade in the United States, could eventually become serious.

What I do claim, however, is that over the next 20 years, the environment is not our primary concern. With one possible exception, I see no justification for elevating an openended and limitless concern for the integrity of the environment to the status of a dominant religious dogma that takes precedence over every other human desire or aspiration. The possible exception may be the accumulation of carbon dioxide resulting from the burning of fossil fuel. Fortunately the carbon dioxide issue is not one that will affect us immediately; it is probably a valid concern for the 21st century. In the meantime, we must study the phenomenon so that we can base policy on the most reliable scientific knowledge.

If the entropists' agenda is not very relevant for the next 20 years, this does not mean that the world faces no global resource or technology problems now. By no means. The overriding issue remains oil. Energy policy over the next 20 years must be aimed at weaning ourselves from oil.

This means, first of all, using *oil* more efficiently. I do not equate this with using *all energy* more efficiently: saving hydroelectricity does not necessarily save oil. The most effective means of encouraging more efficient use of oil is to raise its price. The auto fleet in the United States in 1980 was 8 percent more efficient than in 1973, 20 percent less oil was imported in 1980 than in 1979. Much of this improvement is attributable to the 40 percent rise in the price of oil in 1980 compared to 1979.

A corollary of this view is that we ought to rethink our commitment to conservation. During the coming years we must be discriminating: conserve what is in short supply—that is, oil; use other, more abundant sources of energy to replace oil even if such replacement leads to poorer overall thermodynamic efficiency and therefore less conservation overall.

The entropists have so dominated the discourse that anyone denying conservation to be a transcendent human aim is regarded as hopelessly old-fashioned. Old-fashioned or not, this point of view seems to me to be simple common sense.

The other strategy for reducing oil consumption is to replace it with other energy sources, especially in the nontransport sector. Some of this substitution can come from other fossil fuels, notably coal or gas. A little can come from solar energy in its various manifestations. But there is another, complementary strategy: the rediscovery of electricity.

When fossil fuel or uranium is converted into electricity, only 30 percent of the energy in the fuel is converted into electricity. This thermodynamic inefficiency has been seized upon by many of the entropists as a reason to reject electricity for any but those uses that it can perform uniquely. To use electric resistive heating is viewed as an aberration, and to construct nuclear or coal-fired power plants to provide electricity for resistive heating is regarded as totally wrong. Yet, if what we lack is oil, and what we have is coal or uranium or hydro, then common sense must take precedence over thermodynamic principles. It makes sense to substitute sources we have for oil that we do not have; and efficiency is relevant mainly insofar as it determines the economics of the trade-off.

Much of the prejudice against electricity is doctrinal as well as thermodynamic. Electricity is generally large and centralized, and according to the entropists, large and centralized is ugly, small and decentralized is beautiful. But beauty is in the eye of the beholder. A system that affords a greater measure of convenience is beautiful to one who has no interest in puttering with recalcitrant solar heaters. Moreover, even among the entropists there is dispute as to whether or not centralized electrical systems lead to centralized patterns of living.

Much of the entropists' wrath is directed at nuclear energy, since it is at once electrical, centralized, large and environmentally threatening. For them it is a faulted technology that must be extirpated. And indeed, in several Western European countries nuclear energy has come to a halt.

Yet the returns are not all in: by the 1990s we may well see a turnabout in popular opinion, particularly if the nearly 500 power reactors the world will have operating by then perform well. Among Western countries France alone is continuing to deploy nuclear energy aggressively: will the French experiment succeed? Will the rest of the developed world, in the 1990s, envy France because it will then be importing so much less oil than now?

With few exceptions, countries with a commitment to nuclear energy are centrally planned or politically centralized. Can nuclear energy prosper only at the cost of centralization?

Nuclear energy is doing poorly in the politically decentralized countries—particularly Germany and the United States—because in these countries a fairly substantial minority of their people believe that nuclear energy is unacceptable. Nor do the restrictions on nuclear energy need to be sanctioned—as in Sweden, Australia and Denmark—by political action. If the minority is sufficiently aggressive, it can paralyze the enterprise.

It is for this reason that I consider successful operation of the nuclear system during the next decade to be crucial. Even though the entropists would reject nuclear energy simply because it is centralized, I do not sense this as a politically powerful rallying point for most people. But the spectre of a radioactive cloud arising from a disabled reactor carries strong emotional and therefore political force. Unless this fear is exorcised—mainly by continuing safe and reliable operation of the world's reactors during the 1980s—the nuclear option will be compromised. And if it is, one of the best opportunities for avoiding the entropy trap will be lost.

My own expectation is that 1990 will arrive without a repetition of the 1979 accident at the Three Mile Island nuclear plant in Pennsylvania and, in consequence, we will see a renewed interest in nuclear power in all of the developed countries. Such a renewed deployment is an important part of a rational energy program. Perhaps more relevant for the 1990s, it could be a key element in the strategy for eliminating life-strangling dependence on foreign oil. □

Feminism, Family and Community

By JEAN BETHKE ELSHTAIN

"In their understandable preoccupation with the status of women," says Jean Bethke Elshtain, feminists of the past two decades have been too little concerned with the impact of social change on whole families." Now is the time, she suggests, for a reconciliation between the hopes and concerns of feminism and the universal human need for security and intimacy, answered in both the community and the traditional family. Elshtain, who teaches political science at the University of Massachusetts, Amherst, is the author of *Public Man, Private Woman* and editor of *The Family in Political Thought.*

I WRITE as someone who has been involved in the politics of the U.S. feminist movement since the early 1960s, someone who characterizes her own work as made possible in part by the intellectual ferment feminism has generated. But, as I begin, I find that the image of a strong woman, my grandmother, supplants all other visions, wipes out abstract ideologies and theoretical models. I see her instructing her grandchildren in the crafts that create things of beauty and utility to provide envelopes for our bodies, warmth for our beds and food for our tables. I mark her pride and her intensity, her conviction that she has lived a good and a productive life. I know that what keeps the fires of her life burning is the drive to pass her heritage of wisdom, piety and goodness on to her great-grandchildren.

That my grandmother's image emerges so powerfully is appropriate. For the need to write this piece derives from my discontent with the way "the family" has been treated in much feminist and radical argumentation since the 1960s, and with the way "community," while celebrated, has remained mostly an empty term—for there is no way to create real communities out of an aggregate of "freely" choosing adults.

The term my grandmother uses to describe her people is *unsere Leute,* "our people," an immigrant group who kept a historic identity. None of the values of "our people" mesh neatly with the "needs" of capitalism, nor with market images of human beings, they clash at nearly every point. Yet the ties of such organic communities have been seen by those progressive movements that grew out of Enlightenment rationalism and liberal myths of historic progress as precisely what we all need to be "liberated from." The hard truth we have now come up against is simply this: to the extent that reformers and

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radicals see family and traditional community as reactionary by definition and repressive by nature, to that extent they have bought into a one-dimensional image of human beings. This is a serious charge and I intend to defend it.

First, a few reminders of the way in which the family was singled out by powerful voices within middle-class movements for social change—feminist, radical, "psychological"—as *the* institution most deeply implicated in the oppression of all people but of women in particular. Calls for "smashing" the family, or its dramatic transformation in order to bring it in line with a feminist or left-wing revolution abstractly conceived, helped to invite the reaction we now face. The Right has been able to portray itself as the defender of family life in part because of the early and dramatic hostility of many, though not all, feminists and radicals to all traditional social forms.

The Right's portrayal of feminist and radical antifamilialism is of course drastically overdrawn, but there is just enough truth to make the charges seem plausible. Most American citizens see themselves first and foremost as family men and women and as members of communities, and much of their energy is devoted to keeping these families and communities alive. Thus far feminists and radicals have failed to provide a compelling vision of an alternative society to grip the imagination and gain the adherence of these citizens.

It would be tedious to repeat in detail all the charges against the family, but a reminder is necessary. Unless we recall at least some of these charges, we will fail to appreciate the complex interaction between protest and reaction. My now-yellowed copy of *Women and Revolution,* a "newspaper of revolutionary women's liberation," dated May-June 1971, outlines in bold letters its "program" on family, education and production:

> The institution of the family is inherently reactionary and helps to maintain the capitalist system. The family, as a socioeconomic unit, is oppressive to its members. Women are especially oppressed by the family.... Each nuclear family exists in isolation from the rest of society and thus weakens the class consciousness of the workers.

In a widely circulated essay on "Liberation of Women," the family was declared "the central agent of repression," inculcating "both the subservience of women and sexual taboos." Another manifesto depicted the new mother as a pitiful creature descending into a condition of terminal social decay, imprisoned in the home, which "is perhaps the basis of all evil." These arguments were made by such influential theorists as Kate Millett, for whom the entire society was but the oppressive, patriarchal family writ large, with women cast as universal victims and an oppressed class, or by Germaine Greer, who enjoined women who would be "free" to leave their homes and families in pursuit of the untrammeled life.

True, there were, and are, feminists of all sorts who refused to jump on the antifamilial bandwagon. But this should not obscure the fact that a major thrust of early feminist rhetoric was a dramatic insistence that the family was "the enemy." Even a liberal feminist such as Betty Friedan, in her "first-stage" incarnation, referred to the home as a "comfortable concentration camp" and celebrated, as an alternative to suburban housewifery, not a transformed vision of the human community but women's absorption into the exciting world of those "able, ambitious" men who went off to the city and "kept on growing."

Feminist critics of family life were joined by a variety of (mostly male) cultural radicals. Counterculture protesters sought escape from their uptight families in drug experimentation and communal living. Psychological radicals found in psychiatrist R.D. Laing a guru who proclaimed that all human beings, having been raised in families, were "half-crazed creatures"; familial love and parental concern got redescribed by Laing as devious forms of violence.

In retrospect, much of this criticism was made by radicals who refused to acknowledge any of the legitimate human needs for intimacy and security embedded and answered, however imperfectly, within the traditional family. Already weakened by market forces that eroded community ties and severed work from community life, the American family by the 1960s was a vulnerable target for social criticism and personal-political protest. But family critics failed to come through on what should have been an essential part of their agenda: they did not articulate viable, humane alternatives to replace what they proposed to reform. Instead, they tended to reiterate as dogma the notion that if people were no longer dependent on families, they would get together to demand radical social change.

The unhappy history of the past several decades tells a different story: human beings who were frightened by a world increasingly out of their effective control, concerned to preserve what they saw as traditional values imperiled by liberals and radicals, got caught up in an ideology that sought to return to some imagined Good Old Days when men were men, women knew their place, children kept their place and all was well. It would be inaccurate, and self-serving, for feminists and radicals to see all this as no more than thousands of Americans being manipulated by the Right around such issues as the family. Conservatives addressed themselves forcefully to those cultural issues posed most dramatically in the 1960s. So far, feminists and other social critics have failed to tackle the moral issues posed by the crisis in American institutions, most importantly in the family.

Another frequently sinister alternative to family and community is presented by dozens of cults and cult-like groups which moved into the vacuum created by the thinning-out of community and family ties, even as they further eroded those ties to preclude any outside locus for human relations: "Blood ties are dangerous because they prevent people from being totally dedicated to the Cause."

Those who find *any* analytic comparison between certain sorts of radical protest and the theory and practice of cults unsavory should reflect for a moment on the similarities between the views of the family propounded in each instance—that it is part of an oppressive structure inimical to liberation and the Cause; that it inhibits wholehearted political and social commitment; that it exists to perpetuate an "enemy" system. Then it is worth pondering the proposed solutions: creating some unspecified "higher form" of the family;

forming a cult, a commune or a postrevolutionary society, in which no one has an "exclusive" relationship with anybody; the absorption of child-rearing "functions" by everybody, or by a public bureaucracy, or by a private sector whose enlightened entrepreneurs would meet a social need and also garner a profit.

Ordinary citizens see in all this yet another assault on those social forms that help their lives make sense. The presumptions that in order to have a revolutionary or feminist consciousness one must disconnect oneself from family ties is correctly perceived by members of working-class and traditional communities as destructive of their way of life. They sometimes even recognize in this view an extension of those market forces that have nearly annihilated older forms of social existence and replaced them by atomistic ways of life.

For my grandmother, the "I" of the self was always a "we," located within a dense web of human ties. She could no more think of herself outside the tissue of *unsere Leute* than she could fly. These ties of community were altered forever by the twin forces of liberalism and capitalism, emerging historically in tandem and realizing, in practice, awesome possibilities for both good and ill unthinkable in older social formations. For women, the promises of liberalism were slow to come, including their incorporation into the reigning definition of "the person" as a being with an identity separable from that of others—whether one's spouse, one's family or one's community. Liberal society opened up possibilities for persons to "relocate" themselves, as civil society grew more open-textured, to move away from older ties and constraints toward personal identities that are self-defined and chosen.

The ideal was that free individuals, in pursuit of self-interest, would also be mindful of higher duties as citizens of a political community. Unfortunately, the terms under which individuals act in the public world are thoroughly permeated by market values that undermine possibilities for a shared life of civic virtue. From this free-market model comes the ideology that proclaims all constraints on individual expression to be coercive.

So we get an ideal of nonbinding commitments, with particular appeal to the upper-middle class, the mobile and the well educated, served up as a radical repast. The overall effect of all this "actualizing" of selves is supposed to be a wider good, for modes of radical protest indebted to classical liberalism implicitly embrace a notion of an "invisible hand," operating to transform self-interest and personal freedom into a social benefit.

But this will not do, finally, for there is no way to make a community out of "free individuals." Within this frame, where the individuals are "free" only insofar as each is the sole "proprietor" of self, the only acceptable human relations are those calculated to yield maximum utility. Within such a perspective, all human ties, including marriage, must be construed as starkly contractual—supplanting marriage and communities as social compacts.

The social compact is a different notion from that of contract. It is inseparable from ideals of civic virtue and retains a hold on working-class, religious and rural culture. A compact is no contingent agreement but a solemn commitment to create something "new" out of disparate elements—a family, a community, a polity—whose individual members do not remain "as before" once they become part of this social mode of existence. Within the social compact, community members ideally share values that are sustained by moral suasion, not enforced by coercion. Unlike social-contract theories, the social compact ideal revolves around the varying needs of human beings over the span of their life cycle. Contract theory is a static view: it presents a picture of consenting, rational adults—a world in which no one is born and no one dies. Children, old people, ill and dying people who need care are nowhere to be seen.

Now, in practice, contractual society remains linked, in ways that go unacknowledged, to older notions of the social compact. In political scientist Michael Walzer's words, "What made liberalism endurable for all these years was the fact that the individualism it generated was imperfect, tempered by older restraints and loyalties, by stable patterns of local, ethnic, religious or class relationships. An untempered liberalism would be unendurable." But that is precisely what feminist and radical protest grounded in untrammeled individualism refuses to recognize; this protest has failed to demonstrate convincingly how intimate social relations are to be sustained if individualism continues to erode the social foundations upon which individuals are nourished in the first place.

In the concluding section of this essay I shall draw feminism and traditional notions of family life into a mutual relation in a manner that does not see earlier terms of women's oppression as the only way to restore family life. Instead I shall embrace a revitalized form of family life and community as one way to break the destructive hold of market images on feminist protest. If we fail in this effort, we are likely to see more of the defensive reactions of Right-wing movements and the destructive possibilities of cults. My aim is to contest, not to abandon, the grounds of tradition, a terrain thus far handed over to the Right.

To recover what French writer Simone Weil called our "need for roots," we must first give up the hollow notion that all families or religious institutions reinforce the ideology of the wider society. Only then can we set about recasting a vision of the family as central to any humane way of life. By "family" I mean the widely accepted, popular understanding of the term as having its basis in marriage and kinship, involving links between particular persons that cannot be reduced to instrumental terms. This family stands as one barrier between human beings and the flattening out of their social world under the demands of untrammeled self-interest.

Feminist protest that sought the elimination of this sphere of traditional femininity was understandable when it was a response by women to conditions of their identities that had grown problematic under the pressures of modernization and capitalism. But the end point of this feminist argumentation, whether radical or liberal, is ironically self-defeating, for it requires that women, in the name of feminism, embrace the terms of a public life that was created by men who had rejected or devalued the world of the traditionally "feminine" with its "softer" virtues Behold, the new woman as the old man!

An alternative to the feminist protest that seeks women's full absorption within the market society must make contact with women's traditional social sphere. Women's world arose on a template of concern and care for others. Any viable human community must have in its ranks an important segment devoted to the protection of vulnerable human life. That, historically, has been the mission of women. The pity is not that women reflect an ethic of social responsibility but that the public world has for the most part repudiated such an ethic. Rather than denying women the meaning their traditional world provided, even under conditions of male domination, feminists should move to challenge a society that downgrades female-created and-sustained values.

If it is the case, as developmental psychologist Carol Gilligan has recently argued, that women have a distinctive moral "voice." emphasizing concern and responsibility for others, feminists should be among the first to preserve the sphere that makes this morality possible and to determine how best to extend its imperatives to serve a less-than-humane public world. If Gilligan learns that women now have a greater ability to identify with others, to sustain a variety of personal relationships, and locates those qualities and capacities in women's involvement with children, friends and communities, feminists must think about what would be lost if we gave up this realm altogether in the name of an abstract ideal of liberation.

Right-wing defenses of the family can only be countered by a feminism that agrees that the family is a prerequisite for any form of social life and that a particular ideal of the family is imperative to create a more humane society. One sign of hope is the attempt by many men and women both to sustain strong family ties and simultaneously to struggle toward more egalitarian relations between husband and wife.

The feminism I have in mind bears little resemblance to that "major shift" in thinking on the family some claim has taken place in Betty Friedan's *The Second Stage.* Friedan's vision of the family embodies an accommodation with the corporate and political structures most deeply implicated in the breakdown of family ties in the first place. The kind of family arrangement Friedan celebrates as exemplary (dual-career professionals on flexible work schedules, but often requiring paid help) is possible, at best, for the top 10-15 percent of the American population. For the remaining 85 percent we get the reiteration of a pretty standard liberal agenda—more day care, more reliance on social-engineering "experts," and, *mirabile dictu,* the final "transcendence" of any conflict between "self-realization" and "social good." Such sleight of hand blunts the edges of conflict and diffuses political debate. If, finally, the aims of a feminism guided by the values of current society, the needs of individuals for intimate ties, and the attainment of some notion of the social good are all compatible, what has all the fuss been about?

My version of a feminist perspective that makes a case for family ties, unlike Friedan's, refuses to build either familial or feminist alternatives on the shaky sand of accommodation to the status quo. In defining the family simply as the place "you come home to," Friedan defines it out of existence. Her logic dictates that she put on a par with one another the swinging single in an "adult residential village"; the husband and wife, now grandparents, who have spent 40 years of their lives together; and the four college kids who have rented a house together for the fall semester.

If a feminist case for the family is to bear any critical weight, important conflicts between popular understanding of the family and attempts by a variety of groups to redefine it in a way that accepts nearly any social arrangement human beings conjure up as "families" must not be evaded. To throw the honorable mantle "family" over every ad hoc collection of persons who happen to be under one roof at the same time is to diminish the genuine achievements of family men and women who have retained their commitments to and for one another. Feminism of the sort I propose recognizes that there is no final resolution to the twin goals of individual freedom and social good. To skip over these matters by celebrating widespread social breakdown as evidence of vital social change is to trivialize profoundly important questions.

Within the family of which I write the nourishment of humanity takes place at every point in the life cycle. This family concerns itself with those who have gone before and those who are to come after. But responsibilities for children are paramount. We know—the evidence on this score is overwhelming—that children incur an assault to their humanity if they suffer from neglect, from the uprootedness that comes from being cared for by no one in particular. The evidence we have of what happens to children deprived of attachments to specific adults bears out that we are talking about a prerequisite for authentic human existence.

In their understandable preoccupations with the status and role of women, feminists, until recently, were too little concerned with the impact of social change on whole families. Social feminism of the sort I propose places children in the center of its concern—children surrounded, as they need to be, by parents or their permanent, not temporary, substitutes. Unless or until this happens, the Right will retain a powerful opening wedge into popular consciousness, for ordinary people love and fear for their children. The feminism I seek is not reducible to a clever strategic move; it is, instead, the reaffirmation of moral imperatives and their insertion into the heart of feminist politics.

Antonio Gramsci seems to have become aware of this toward the end of his life when he wrote, in a passage of exquisite pathos:

> How many times have I wondered if it is really possible to forge links with a mass of people when one has never had strong feelings for anyone, not even one's parents; if it is possible to love a collectivity when one has not been deeply loved oneself, by individual human creatures. Hasn't this had some effect on my life as a militant, has it not tended to make me sterile and reduce my quality as a revolutionary by making everything a matter of intellect, of mere magical calculation?

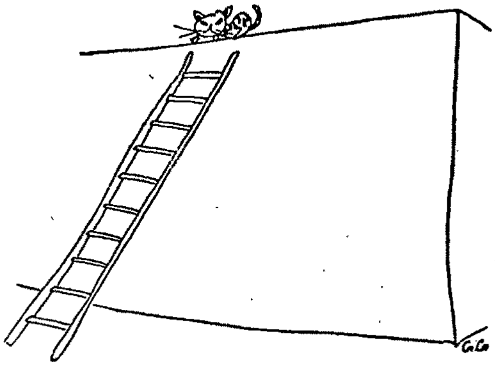
My call, finally, is for a rethinking of terms that have tended to overschematize the world as one of either/ors: either traditional family life or careerism, and so on. The vision I propose opens the way to a transformed notion of community that repudiates the unacceptable poles of narcissistic self-absorption, on the one hand, and single-minded, overweening commitment to "the

Cause" on the other. It sees human beings as social but not as so oversocialized that they emerge as passive reactors to external stimuli. In affirming the dignity of the human subject, beginning with the needs of children, social feminism challenges irresponsible corporate power and a politics of group self-interest, for both run roughshod over the needs of families.

If we dare to hope for a future, one coherent way is to articulate a vision of feminism and a radical politics that does not require that either feminism or radicalism be feared or despised by decent, ordinary people. "American history and tradition," writes political theorist Harry Boyte,

> like that of any nation, embodies contradictions between individualist, democratic and authoritarian elements. To reclaim the best in America's traditions and history is to rediscover the popular democratic heritage: our nation's civic idealism, our practices of mutual aid and self-help, our religious wellsprings of social justice.

I began these reflections on feminism, family and community by honoring the integrity of my grandmother. I will conclude by recalling Virginia Woolf's prescient cry to the women of her generation that the education of their uneducated mothers and grandmothers must have had "great virtues as well as defects" and that "we should be extremely foolish if we threw away the results of that education or gave up the knowledge that we have obtained from it for any bribe or decoration whatever." □



Lewis Mumford, Philosopher of the City

By MARTIN FILLER

The long-awaited autobiography of Lewis Mumford, *Sketches from Life* (published in 1982 and excerpted here), traces his development from boyhood in turn-of-the-century New York through his emergence as a major literary figure some 40 years later. But what set of circumstances aided Mumford's trailblazing work on American architecture? How did he establish himself as an authoritative voice for more humane design and planning? Why did he become one of the few authentic moral spokesmen of our time? In this article, Martin Filler examines Mumford's account of his life and assesses his "unique place in so many disciplines, literature, philosophy and culture in its widest sense, as well as architecture." Filler is editor of *House & Garden* and writes criticism on architecture and design for a number of other publications.

LEWIS Mumford began to write his autobiography in 1956 at the age of 61, and worked on it at intermittent stretches over the ensuing 25 years. As time passed and Mumford set the manuscript aside to take up other projects, there were those who began to suspect that he was not particularly interested, or perhaps did not even want to have this book brought out during his lifetime. But happily it has been published at last, and its author —now 87 and still writing—can enjoy seeing the result of his long effort compared, as it deserves, to the finest examples of autobiography which the United States has ever produced. *Sketches from Life* can be ranked with the autobiographies of Benjamin Franklin, Henry Adams, Lincoln Steffens and Frank Lloyd Wright: that is to say, among the rare, self-told life stories that are of surpassing literary attainment above and beyond their factual content.

Not that this should come as a surprise, for Mumford's 27 previous books and almost 1,000 articles have amply confirmed him as a writer of importance over the past 50 years. Yet Mumford has not been generally recognized as one of the great prose stylists of this century, which he is. That evaluation is borne out from the very first page of this splendid work, the kind of autobiography that people seem virtually incapable of writing anymore. It is revealing but not self-dramatizing, frank but not prurient, nostalgic but not sentimental.

Sketches from Life is a rich narrative that will be read in a number of different ways. Some will see it as a confessional exercise in the Augus-

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tinian mode, in which the author grapples with the central life-questions of his parentage, his sexuality and his vocational ambitions. Others will feel that the most memorable portrait in *Sketches from Life* is that of Mumford's remarkable wife of 60 years, Sophia, who emerges as one of the most sympathetic women to be depicted in recent literature. Still others will read this book for its historical interest. It is a first person document of New York at the end of the Gilded Age, here seen with affection but no illusion. Later, it gives a new reading of a fabled chapter in American letters—the generation of writers who came to prominence during the 1920s, many of whom were Mumford's friends and colleagues: among them Van Wyck Brooks and Thorstein Veblen.

There is yet another absorbing aspect to this book: its recapitulation of the author's rise as an architecture critic. All through his career Mumford has assiduously (and somewhat unsuccessfully) resisted the limited definition as an architecture critic solely, even when that designation has been preceded by glowing superlatives. He has preferred to see himself, with justification, as a generalist. The fact remains, however, that no matter how important and wide-ranging Mumford's other contributions are, his writing on architecture has had few equals.

Significantly, the story of how Mumford found his best-known metier is not given as a continuous account in *Sketches from Life.* Most of the way through, the architectural sub-theme is sighted in brief, distant glimpses and then disappears, occasionally coming into view again and again vanishing, only to become fully visible very close to the end of the book. Mumford himself is aware of this surprising (and unconsciously intentional?) lapse and he writes of his amazement when:

"I discover(ed) I had composed some 16 or 18 chapters with hardly more than a passing reference to one of the most constant and significant phases of my experience—my response to architecture...."

Nonetheless, careful reading of *Sketches from Life* will yield a fascinating and highly instructive personal view of Mumford's architectural career.

Lewis Mumford's childhood would not at first seem to have provided many incentives toward his eventual professional direction. His mother, who ran a boarding house in New York City, did not hang pictures of great architectural landmarks around his crib, as Frank Lloyd Wright's mother did to stimulate her son's interest in the profession she had chosen for him. Nor did the future critic's mother share the deep interest in progressive early childhood education held by that future architect's mother. As Mumford makes abundantly clear, his immediate family did not have intellectual inclinations.

But there were decisive influences of other kinds. His grandfather unknowingly awakened a lasting awareness of cities in the boy by taking him along on leisurely daily walks around New York. This was the city at the turn of the century, that fleeting moment when the last pungent traces of what Walt Whitman and Herman Melville had known of New York could still be sensed. No wonder Mumford was able, years later, to interpret "The Golden Day" of 19th-century American literature so vividly to the subsequent century of Americans.

If his closest relatives were more interested in card playing and horse racing than in books and ideas, Mumford's family in Philadelphia provided quite another example:

"From Aunt Elvina and Uncle James I got a glimpse of the aristocratic principle: a life of the mind, with high standards of achievement in every department, exacting much of others but even more of themselves, with a sense of social responsibility on every occasion, with an utter contempt for any merely fashionable criteria of either conduct or taste"

That could serve as a veritable summary of Mumford's own moral makeup. From an early age he was adept at learning the important values of life as he came across them, as is shown in another reminiscence of his childhood. Mumford's primary education in New York's public school system was for the most part unimaginative, but he still remembers the day when his sixth grade teacher bravely stood up to the martinet principal of his grammar school, some 75 years ago:

"That lesson in civic courage, in unshakable firmness in the face of superior power, was not provided in the curriculum, but it has lasted longer than anything else I was taught."

Fortunately, the academic quality of Mumford's secondary school and college education was considerably higher. He was greatly stimulated by several of his teachers at Stuyvesant High School, one of the legendary institutions in the history of public education in America. Despite that school's strong scientific and technical orientation, Mumford's senior yearbook photo bore the ironic caption, "Mumford will *not* be an engineer." Yet in retrospect one can surmise the influence that specific emphasis at Stuyvesant had on the thinking of the man who was later to write brilliant critiques on the role of the machine in society.

After graduation, the combination of his hazy career plans and his lack of enough money to enroll full time in a private university led Mumford to seek a job during the day and to attend New York's tuition-free City College at night. The Evening Session's excellent faculty, the lack of compulsory courses and the atmosphere of seriousness among the mature students (many of whom were already well established in their daytime careers) were perfect for Mumford's emergent temperament.

Mumford's difficulties after he transferred to the City College Day Session two years later were symptomatic of his growing need for intellectual independence. He was becoming much more interested in his budding career as a writer than in his required work as a student. One heady success emboldened Mumford tremendously. He entered a competition held by the now-defunct magazine *Metropolitan* for a response to an article by George Bernard Shaw. Though the first prize was won by Lincoln Steffens, the editors were so impressed with the 18-year-old Mumford's essay that his was the only other one published. Soon Mumford found himself called to the college dean's office, where:

"...I learned that I was supposed, like anyone else, to keep up my attendance and do regular academic work, whether I had literary aspirations or not. Spurred as I was by my own inner life, and doubtless inflamed by pride, this seemed to me tick-tock all over again: the shades of the prison house were closing in once

more. But I was no longer passive, no longer docile, no longer concerned with being—academically at least—the first in my class: in fact, I was in revolt against all conventions and conformities."

Mumford's flagging City College career was interrupted by a tubercular episode in 1915. His convalescence—giving him further opportunity for reading and reflection—strengthened his solitary approach to learning. After his recovery he resumed his formal studies at New York University, Columbia, and again at City College, but in the end took no degree from any college, despite the surfeit of course credits that would have allowed him to do so.

Underlying Mumford's whole retelling of the story of his education is his obvious pride in the validity of his unconventional approach to gaining knowledge. Mumford's chapter on his college years is tellingly entitled "Manahatta, My University," and his use of Walt Whitman's eponymous name for New York (taken from the Indian tribe which first settled the island) is a clue to Mumford's Whitmanesque view of education as necessarily independent and as a much broader set of experiences than merely attending classes.

Before Mumford left academe for good, the dean of the Columbia University School of Journalism, Talcott Williams, counseled him not to use his small inheritance toward paying for a journalism degree in that recently established program:

" 'Instead, if I were you (Williams said) I'd hang onto that four thousand dollars as long as I could. It's your margin of freedom: while you have it, you need never be driven to do work that goes against your conscience or offers you no inner reward; it will protect you from drudgery and give you the time you need to get started on your proper work....' "

Mumford had first become aware of modern architecture (in the form of Eliel Saarinen's newly completed Helsinki Railway Station of 1905-14) while working on a college term paper on Scandinavia, but it was in a later academic setting of quite another sort that his interest in architecture really began to take root. America's entry into World War I in 1917 encouraged Mumford to enlist in the navy. He was eventually stationed in Cambridge, Massachusetts, to attend the U.S. Navy Radio School, and his classes were held in a requisitioned building on the Harvard campus: H.H. Richardson's Austin Hall. The impression that building made on Mumford was strong and immediate, but, as he recalls:

"...even before I had identified the building with Richardson, I loved the shingled Stoughton House on Brattle Street."

Clearly, he had an intuitive feel for the work of the then-neglected Richardson, whom Mumford later helped restore to the front ranks of American architectural history in *Sticks and Stones* and *The Brown Decades.* In Cambridge Mumford lived in a boarding house where one of his fellow lodgers was William Blake Bigelow, a retired architect. The old architect and the young writer struck up a valuable friendship:

"From him I got, almost by osmosis, a fuller initiation into the ideas and architecture of the period; all the more because he had kept bound copies of The Century *and* Scribner's Magazine, *to which Mrs. Schuyler van Rensselaer,*

the first biographer of Richardson, had contributed. Bigelow helpfully put these periodicals at my disposal and further vivified them by his own recollections.... Bigelow opened a fresh path for me, in a way that no American book or university course on architecture then in existence could have done."

After Mumford was mustered out of the navy in 1919, he landed a job as an associate editor at *The Dial*, one of the most distinguished periodicals during that exceptionally rich epoch in American literary journalism. He stayed there only seven months but at *The Dial* he met the editor's secretary, Sophia Wittenberg, who two years later was to become Mumford's wife and amanuensis.

In 1919 Mumford also met Charles Harris Whitaker, the influential editor of the *Journal of the American Institute of Architects*, and through him was eventually drawn into the circle of reform-minded architects and planners for whose writings the *JAIA* was then a leading outlet. Mumford's first important published piece on architecture appeared in 1921 in yet another magazine, *The New Republic*. Entitled "Machinery and the Modern Style," Mumford's seminal essay predated by two years the publication of Le Corbusier's *Vers une architecture*, in which the purity and beauty of industrial designs were viewed with almost mythic reverence.

Mumford wrote a half dozen more pieces on architecture over the next two years, and on the basis of those articles the director of The New School for Social Research asked Mumford in 1923 to give a course on contemporary architecture. Mumford agreed, but after his six months' preparation, only six auditors came to the first class, and the course was then dropped. Mumford, undaunted, thereupon transformed his undelivered lectures into a series of articles which then in turn became the chapters of *Sticks and Stones*, Mumford's first book on architecture, published in 1924.

Sticks and Stones established Mumford almost overnight as a leading figure in American architecture criticism. His new stature was indeed merited by the sheer originality and quality of the work itself, but was further abetted, as Mumford himself readily admits:

"...because outside of a limited academic area...there were then no serious competitors, since the most competent of our architectural historians and critics, Montgomery Schuyler, had died (in 1914)."

Mumford's very first book, *The Story of Utopias*, had been brought out two years before *Sticks and Stones*, and the ease with which he entered the then-idyllic world of book publishing must be counted as another of the most fortunate circumstances surrounding his career. The years between 1914 and 1929 were indeed, as Mumford puts it, "the Golden Age for coming American writers," when a vision of what books at their best could be was shared and made real by publishers, editors and authors working with a rare unanimity of purpose.

All in all, his publishers' faith in him has been very well rewarded, for Mumford's books have enjoyed spectacularly long lives. Astonishingly, no fewer than 23 of his 28 books are still in print, some after six decades, no doubt a record among living writers of nonfiction.

During the last half of the '20s Mumford contributed over 50 pieces on architecture, design and city planning. Mumford was further fortunate in the forbearance of his young wife, who, far from prodding him into the pursuit of money, was quite content with what their friend Van Wyck Brooks described as their "ascetic household."

By 1927 Mumford had given up the idea of working as a full-time staff member for any publication, and from that point on concentrated solely on his own writing. During that year, according to Mumford, he turned down many offers of employment, including one to become art adviser to a wealthy corporation:

"The offer...occasioned a flutter of debate in our household; for Sophia was a little piqued over the fact that I refused even to confer with the agency and find out what the scope of the work and the salary would be. I told her I simply didn't want to be tempted. Such a job, with such a well-established corporation, might offer an income triple our present one, and once it came as a definite offer, might be hard to resist. What was worse...our standard of expenditure would go up; and once it did, my chances of coming through as a writer would be gone. I never said No with a better conscience...."

But the onset of the Great Depression and Mumford's initiation of the major project of his career—the *Renewal of Life* tetralogy, which he began in the early '30s—called for a more dependable source of income than the catch-as-catch-can existence he had been used to for some time.

The dream-perfect answer to this problem came in 1931 from the legendary editor of *The New Yorker,* Harold Ross, who asked Mumford to take over the magazine's architecture column. The rest, as they say, is history. "The Sky Line," as the column was named, occasioned Mumford's most copious outpouring of architectural criticism. Of more practical importance, his association with *The New Yorker* was to become Mumford's fiscal mainstay during what was his most prolific decade, in which he also wrote two of his most important books, *Technics and Civilization* (published in 1934) and *The Culture of Cities* (published in 1938).

From his first *New Yorker* article on June 20, 1931, until his last "Sky Line" piece on December 7, 1963, Mumford wrote 158 architectural essays for that magazine. Yet what is not so widely remembered is that from 1932 to 1937 Mumford also doubled as *The New Yorker's* art critic, and during that five-year stint actually produced more art reviews than "Sky Line" pieces. Thus, from 1931 until the beginning of a five-year hiatus brought on by America's entry into World War II, Mumford wrote a total of 187 articles on art and architecture for *The New Yorker,* a magazine known to have paid its contributors very well, especially so for those lean Depression years.

After 1936, Mumford and his family moved permanently to the small town of Amenia in New York where they had bought an 1830s Greek Revival farmhouse. He generally went to New York City only two days a week—visiting art galleries, viewing buildings, handing in and checking his copy at *The New Yorker*—with the other five days of each week devoted to his writing at home. He was therefore not a familiar presence at that magazine's offices, yet there are few figures from those great days under Ross who remain more memorably associated with *The New Yorker* than Lewis Mumford.

On assuming his post at *The New Yorker*, Mumford might have adopted a cautious approach to his criticism. Yet he chose instead to leap right into the fray with his sharp critique of Rockefeller Center, then the subject of a great deal of flack-inspired ballyhoo to help stimulate its rental during a stagnant phase in the Depression real estate market. Yet much to Mumford's credit—and proof of his essential fairmindedness—is his later, revised appraisal, quite positive in comparison to his first piece, written after the complex was finally completed in 1940 ("Rockefeller Center Revisited"). Conversely, Mumford felt no compunction about changing his critical response in the opposite direction when he felt it was called for. Although Mumford was full of praise for the humane and beautifully designed early works of Robert Moses, Mumford later became one of his most outspoken critics once Moses' work took its eventual turn to physical bleakness and spiritual ossification.

In a self-written biographical blurb, Mumford once described his work on architecture as "mainly a social and esthetic interpretation." The order in which he placed those two adjectives tells all, for Mumford has always put human imperatives ahead of formal considerations in his architecture criticism. In Mumford's view, architecture succeeds only if it succeeds for people, if it enhances their environment, their communities and their individual sense of self. This is not to say that he has had no interest in the visual aspects of buildings. Far from it: he has often displayed great perspicacity in extrapolating the meaning of architecture from its physical appearance. Furthermore, his highly developed descriptive abilities have allowed him to translate those visual perceptions into vivid words even without the aid of photographs or drawings. "The Sky Line," it should be remembered, did not have illustrations, making Mumford's extraordinary rapport with his lay audience all the more remarkable.

Especially interesting now, in light of the currently fashionable attacks against modern architecture, is Mumford's conviction that early modernism was indeed in concert with the humane and life-affirming values he has always championed. His extensive inspection of modern housing in Europe during the early 1930s only reinforced that belief. But Mumford had no ideological stake in modernism as a doctrine, and when inferior and bastardized adaptations of it began to be built in the United States after World War II, he railed against their dehumanizing effects as strongly as he had earlier attacked the false historicizing pastiches of the pre-modern period.

People are the thing, human betterment the goal and the rest must be evaluated accordingly: that has been Mumford's consistent theme. His unswerving point of reference echoes the similar precepts of his great intellectual master, the Scottish biologist and planning theorist Sir Patrick Geddes. Geddes once wrote, with a tart pithiness that prefigures Mumford's critical style, that "the one and only building which can be constructed from measurements and financial estimate alone, independently of living use, is a coffin." Mumford has always been outspoken in advocating that same conception of architecture.

Judging work without fear or favor has sometimes been seen as a potentially self-defeating stance for an architecture critic to take. Compared to the critics of other art forms, the architecture critic often depends on the cooperation of the artist to a degree not necessarily required by those who evaluate other fields of creative endeavor. Although Mumford has been well acquainted with many of the leading architects of the 20th century, he has made a point of maintaining his independence from them, no matter how much more information he might have been able to glean from them firsthand through closer personal contact. Mumford discusses the dangerous allure that an important architect can exert on a critic in his riveting retelling of his paradoxical friendship—if that is the term—with Frank Lloyd Wright, the most complete picture in *Sketches from Life* of his dealings with an architect.

In 1927, two years after Mumford's appreciative (though he terms it "pathetically meager and tentative") article on Wright appeared in the Dutch architectural journal *Wendingen,* the 32-year-old critic received a summons from the 60-year-old architect to one of Wright's famous lunches at New York's Plaza Hotel. Mumford, himself never a slouch when it came to self-confidence, found that:

"One could not be in the presence of Wright for even half an hour without feeling the inner confidence bred by his genius. Certainly it was no flattering appreciation of his work by me that had led him to seek me out. Nor had I approached him in turn by being a worshipful disciple.... Perhaps that explains why we never became intimate.... This was not for lack of good will on Wright's part—or on mine. In the early '30s he actually invited me to take up residence in Taliesin to help him run the school there.... But Wright could not understand my unwillingness to abandon my vocation as a writer to have the honor of serving his genius...."

To be sure, there was a strong element of competitiveness between these two formidable egos, of which Mumford seems to be quite aware:

"(Wright had) an innate desire to dominate and subdue those around him. So after our early meetings, my relationship to him became one of wary mutual respect.... I sensed that if our friendly relations became too close, I would surrender my right as a critic to pass an unfavorable judgment on any of his sacred beliefs or achievements."

A serious breach developed between Wright and Mumford over the former's isolationist and the latter's interventionist positions as America drew closer to involvement in World War II, but that rift was eventually healed. A far more personal and permanent break was caused in 1953 by Wright's response to Mumford's two-part "Sky Line" series evaluating the architect's career on the occasion of the major Wright retrospective "Sixty Years of Living Architecture," held in New York.

The first installment of the essay was generally complimentary, and included Mumford's extraordinary (and well deserved) encomium of Wright as "one of the most creative architectural geniuses of all time." The second piece, however, was considerably more critical. In it, Mumford—who has always been at his incisive best when writing on Wright—perceptively noted Wright's increasing inclination to "coddle his idiosyncracies," and saw in the architect's "obsessive reiterativeness... a tendency to replace the engineering principle of least effort with the baroque principle of the greatest show...." Needless to say, this didn't sit at all well with the Master. In a scorching letter he shot off to Mumford, Wright denounced him as an "ignoramus" and a "mere scribbler."

"When I answered him promptly (Mumford writes), I told him that I respected his greatness too much to dilute it by sweetening my critical appreciation with undiluted praise.... I was about to sign it in my usual fashion, but a sudden impish impulse prompted me to sign it instead in the style of Frank Lloyd Wright himself: 'With all respect and admiration as from one Master to another....' "

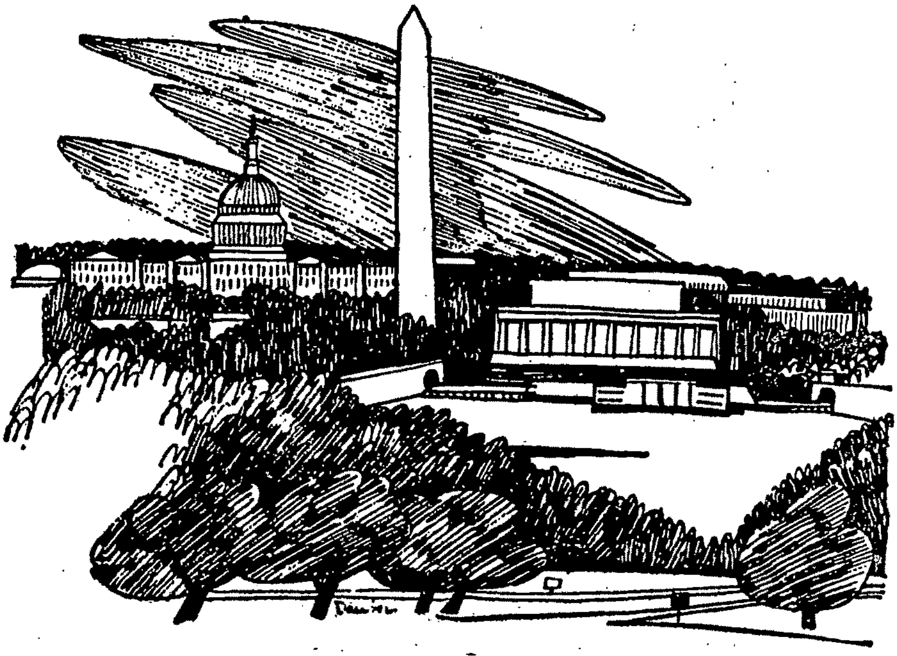
Mumford's contacts with other architects generally followed the same practical belief that it was best for all concerned if a certain distance between critic and subject were maintained. Even the architects who were nearest to Mumford in philosophical outlook could never be guaranteed rubber-stamp approval by this obstinately independent thinker.

Mumford's move to Amenia, New York—where he has lived now for 45 years—made it considerably easier for him to absent himself from possibly contaminating contacts with the architectural establishment, but he did not become a rusticated recluse, as has sometimes been claimed. Actually, Mumford's frequent visiting professorships at various universities—Dartmouth, Alabama College, Harvard, North Carolina State, Stanford, Berkeley, the University of Pennsylvania and M.I.T. among them—have afforded him a much broader contact with various currents of American architectural thought and practice than would have been the case if his sights had been set solely on the New York architectural scene. As with most of the other major decisions in his life, his choice of a home far from the proverbial madding crowd was determined by the priority he has always given his career.

As the 1930s wore on, Mumford's integral view of civilization as an inseparable skein of interwoven concerns—pervasively expressed in his books of that decade—led him to the conclusion that the totalitarian threat posed by fascism was beyond the possibility of compromise or appeasement. Early on he became one of the leading public figures who urged America's involvement in the struggle against Hitler. Mumford's growing recognition as a social philosopher lent extra credence to his warning voice.

Although *Sketches from Life* ends in 1940 (its author has no plans for a sequel), the basic pattern for the rest of his public life by then had been determined. Mumford has continued in the same vein of tireless and comprehensive concern that characterized his early years. And just as Mumford's stature as a world citizen has been enhanced by his panoramic understanding of the forces that motivate human events, so has his importance as an architecture critic been magnified by his insistence that he is more, much more, than that. Mumford has never been the kind of architectural historian who identifies styles but does not explicate meaning. Neither has he been the kind of architecture critic who analyzes forms but does not see buildings in their largest social context. Mumford has never shrunk from his essentially Ruskinian moral attitude that art and architecture are there to teach us—not abstract theories, but home truths about ourselves and our human condition.

His most valuable asset in maintaining his unique place in so many diverse disciplines—American literature, philosophy and culture in its widest sense, as well as architecture—has been his unifying overview of them all, which in turn has enriched each one of them individually. Beneath that, though, is the basic principle that has guided his work in every field: he is incorruptible, from outside influences as much as from his own lesser instincts, which he has shown remarkable fortitude in fending off. The story of that winning battle makes *Sketches from Life* a fitting capstone to an epochal career. □



An Excerpt from 'Sketches from Life'

By LEWIS MUMFORD

I was a child of the city, and for the first 30 years of my life I knew the country only as a visitor, though the occasional summers I spent on a Vermont farm before 1910 had first and last an influence on me that offset my long incarceration in what Melville called "the Babylonish brick-kiln" of New York. Not merely was I a city boy but a New Yorker, indeed a son of Manhattan, who looked upon specimens from all other cities as provincial—especially Brooklynites. Deep down, I suppose, some of that original sense of metropolitan superiority, which has nothing to do with me personally, still lurks.

My first dream-swift memory brings forth a sunlit room, with the neighbors' children gaping at goldfish swimming about in a bowl. This dates back, my mother once told me, to our fleeting refuge in a flat on Amsterdam Avenue at the corner of Ninety-seventh Street when I was two. But my earliest clear picture is at three—that of the backyard behind a four-story brownstone front on West Sixty-fifth Street, where my mother, in spring, would thrust a few pansy plants into the ground, not because she wanted a garden, but because she loved the pansies....

The backyard, where I played, was safe from all intruders but cats, by reason of one of the high wooden fences with which New Yorkers always enclosed those dreary areas, though its paved path was too uneven to encourage even tricycle riding. From Sixty-fifth Street up, Broadway was still full of vacant lots, with visible chickens and market gardens, genuine beer gardens like Unter den Linden, and even more rural areas. Since for the first quarter of a century of my life I lived between Central Park and Riverside Drive, wide lawns and tree-lined promenades are inseparable in my mind from the design of every great city; for what London, Paris and Rome boasted, New York then possessed.

My daily walks with my grandfather in Central Park or along Riverside Drive left an ineffaceable impression of noble leisure, though I did not become actively conscious of beauty till I was 13 and one morning in Central Park saw a mist-veiled landscape transformed, in Turner's magical fashion, by the sun....

Looking back now, I can see how deeply my walks with my grandfather influenced my later life; not least, how important they were in counteracting the narrow, secondhand learning and the bureaucratic routines of the elementary schools I attended. Being a passive, timid

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From *Sketches from Life* by Lewis Mumford. © 1982 by Lewis Mumford. Reprinted by permission of Lewis Mumford.

child, weakened before seven by a prolonged case of measles followed by mastoiditis and a long, violent bout of whooping cough, I might have found my life completely desiccated by the current academic drilling, but for the peephole glimpses into other lives and other ways that these walks under the tutelage of my grandfather had given me.

During the period when I was growing up, a series of gigantic shifts and upheavals took place in the urban scene around me; and many of these were, astonishingly, changes for the better. It was then that the first new patch of open play space was carved out of one of the worst slum areas on the East Side, to become Jacob Riis Park; it was then that the first free-standing skyscraper, the Flatiron Building, was built by Daniel H. Burnham, the successor of Burnham and Root, the Root who had built that other free-standing office building, the Monadnock Block, in Chicago. It was then that the series of bridges north of the Brooklyn Bridge was built, culminating in the most handsome one after the Brooklyn Bridge, the Hellgate Railroad Bridge. In the first decades of the 20th century, Park Avenue likewise achieved a moment of exemplary urbanity and good form, with a broad green strip down the middle that made a pleasant pedestrian walk; and it was then that a great tidal movement of population took place, into the Bronx for the lower-income groups and out into the suburbs for the well-to-do.

I was there as a boy; I saw it all. The city grew along with the visible proofs of my own growth. The disappearance of 'Little Coney Island', an amusement park at 110th Street and Broadway; the rise of Columbia University on the site of the old Bloomingdale Insane Asylum; the slow, tortuous building of St. John's Cathedral, never again to be such a satisfactory monument as in the brute stone of its original Romanesque form; the main building of the New York Public Library on the site of the old reservoir at Forty-second Street, which I used to follow as a high-school student on occasional walks home in the afternoon. All this went on before my eyes, like the later covering over of the gaping railroad yards between Vanderbilt and Lexington Avenues. Not least, the new green double-decker motor buses, careening along Riverside Drive, gave one a fresh sense of the city in movement.

The city I once knew so intensely has been wrecked; most of what remains will soon vanish; and therewith scattered fragments of my own life will disappear in the rubble that is carted away. I have not Frank Lloyd Wright's consolation, when he designed that overmassive pillbox, the Guggenheim Museum, that the building made in his image would survive a nuclear bombing, so that even though the rest of the city was destroyed, his spirit would still be present to survey the ruins. In that sense I share the fate of my generation. Whether hilarious or sad, we are all displaced persons.

*

In centering this account of my childhood in New York mainly on my grandfather—my mother and my nurse will follow—and in showing mainly what I saw through his eyes or in his company, I have hardly done justice to the impressions left by other parts of the city that I constantly touched, or to all those celebrations and seasonal events that colored my childhood and made it in so many ways utterly different from that of a child growing up in the homogenized, high-rise environment of the present day.

No picture of growing up in that New York would be true to its special quality if one left out the parades and public celebrations. On those occasions even today the whole city becomes a theater and all its residents actors as well as spectators: for such assemblages, mere numbers justify themselves. But I would cap those early memories by a single episode, perhaps the most exciting of all: the day after Justice Charles Evans Hughes' supposed Presidential victory over Woodrow Wilson in 1916. At noon, in the main reading room of the Public Library, I heard the strange, unexpected blare of a brass band, and rushing out onto Fifth Avenue, I beheld a jubilant impromptu procession, led by a pickup band, celebrating Woodrow Wilson's triumph. Everyone was sure then Wilson would "*Keep Us Out of War.*"

Even the intimate daily events of the city had a special domestic color: this somehow was most in evidence on a late spring or summer evening, along the streets where private, middle-class row houses prevailed. Each family, or the occupants of each boarding house, would swarm on the high stoops, usually sitting on straw mats, often on hot nights burning incense or acrid Chinese punk to keep off the mosquitoes, waving palm-leaf fans, chatting among themselves, occasionally exchanging greetings with neighbors, whilst keeping an eye on the children having a last game of tag or running a buckboard wagon lighted by a candle in a cigar box, with a little boy as human motor to push it from the rear, up and down the block.

That picture, as I bring it back, has a kind of bucolic innocence and neighborliness which recalls that vanished age. Through fluttering lace curtains a lonely piano might be pleading the cause of love, but except for that and the rumble of the elevated or the clop-clop of a cab horse on the cobblestones, the human voice struck the dominant note: chuckling, laughing, just idly talking, sometimes whistling and even singing. But if some dire event or some criminal outrage had occurred later in the evening, the raucous shout of a newsboy crying "Uxtry! Uxtry! All about the great explosion!' might chill the spine for a moment.

This life, without motion pictures, without telephones, without radios, without television sets, without motorcars, without the vast volumes of standardized goods that must nowadays be bought promptly and consumed rapidly was not destitute of amusement and color: but it found its variety in little changes, little differences. The neighborhood grocery store may fittingly symbolize this. Every grocer's boasted a row of black lacquered bins holding tea and coffee in bulk, which were identified by their place of origin. One bought coffees—Santos, Rio, Maracaibo, Java, Mocha—knowing their special flavors and gauging the quality against a wide range of prices.

That colorful, still selective middle-class world began to disappear in New York after the First World War; and since the '50s has been disappearing in Europe, where it clung tenaciously until after the Second World War. (The Monoprix chain in Paris—and Le Drug Store—sounded the new ominous note.) Nothing so well indicates to me the difference between my own generation and the present one as the fact that I do not, without a certain inner resistance and resentment, accept a system of marketing in which all the decisions have been taken out of the hands of both the shopkeeper and the customer and put under the remote control of the market researcher and the packaging expert, the advertising agency and the wholesale distributor. Those who have grown up in this packaged world accept such external controls and compulsions as normal: their loss of choice, their loss of taste, they do not even notice, for they have never known anything different. We have now exchanged autonomy for automation.

*

But one thing is missing from this nostalgic picture. What I cannot quite recapture is the little boy who first took this in: or rather, I cannot get inside him, for he, too, flits across my 'finder' as merely part of the scene: much more scenery than person. For the rest, I behold that child as an outsider might, now squatting on the floor, making drawings of battleships or horses, now calling out "Good night! What time is it?" repeatedly, after going to bed, to make sure of the presence of his mother or grandfather in the next room. Often enough the whole family is playing pinochle, and his wakeful inquiries are trying their patience. Or again, he is playing red rover or buttons with the little gang on the block, like any other West Side boy.

Oh! but where is that bright lad himself, growing year by year in his own consciousness of himself? Somehow he eludes me, and I now begin to guess the reason: He is indissolubly part of the self I have become and therefore cannot be viewed from a vantage point outside. When I look too intently at him, I have the horrifying sense one sometimes has if one looks too long at one's image in the mirror. If one keeps on staring, nothing will remain except a mocking mask, detached from any living reality. ☐

An Interview with Lawrence Kasdan

For the past two years it was hard to go to the movies without encountering a Lawrence Kasdan credit line: for screenwriting on *The Empire Strikes Back, Raiders of the Lost Ark, Continental Divide* and *Return of the Jedi* and for screenwriting and directing on *Body Heat.* A rash of articles appeared: the critics liked the pace and wit of Kasdan's genre-inspired screenplays and his stylish directing debut in a latter-day film noir. It was not always that way. Kasdan, who is in his mid-30s, studied English and education at the University of Michigan and then took a job with an advertising agency. He wrote screenplays at night and on weekends for years without any offer from a studio—or even an agent. In 1977, by then living in Los Angeles, Kasdan finally hit pay dirt, selling two scripts in three months.

Q: You've said that all of the material you've worked on is material that you really care about. Is that what you prefer?
A: I'm not sure I know any other approach. It happens every day in Hollywood that people work on things that don't mean anything to them. There are a lot of reasons why you do what you do, and I don't mean to judge that. It's just that I don't know what you draw from if it isn't material that you're committed to. You need so much energy that if you're not drawing from some inner resources, I don't know where the ideas come from. I don't know where the enthusiasm comes from. You don't ever want it to be just a mechanical process.

Q: What led you to write *Body Heat?*
A: Well, what started it had to do with certain feelings I was having about some of my friends and contemporaries. We were in college in the '60s, and even though horrible things were going on in the country, it was an exciting time for us. We did pretty much whatever we wanted to do. In the '70s we entered the world and discovered we could no longer do what we wanted, and we were confronted with a whole mix of values that suddenly had more attraction for us than we thought they would in college. For some people, the frustration of no longer having their way turned into casting about for quick solutions to their own happiness. Suddenly they're looking around for that great business deal that's going to make them a mint and buy their freedom.

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Ned, in *Body Heat,* is one of those people. He has an ease and charm about him that probably served him well in secondary school and college, and he made it through law school. He sort of floated through, and he didn't have to be terribly good at anything to float through. Now he finds himself doing work that is totally unsatisfying, there's no focus to his life, and those things he desires are constantly out of his reach.

Q: Is the emphasis on talk intentional in *Body Heat?*
A: *Body Heat* is talk heavy and it was meant to be. That is one of the things I wanted to do with it. I wanted to make a movie that you have to listen to, because I don't think there have been many in America lately and I miss them. Clearly, you can do almost everything visually if you want to. The question is, do you want to? I mean, is there pleasure in language for you? Is there something about the way people talk that thrills and elucidates? I enjoy talk. You can make a movie which doesn't require any, and *Raiders of the Lost Ark* is certainly like that. I hope that the dialogue that's there makes *Raiders* a more pleasurable experience, but if you turn off the sound, you have no trouble following the story.

Q: How much did *Body Heat* change during the shooting? Was the passion so intense in the script?
A: The script for *Body Heat* is very, very close to the finished film. The script turned people on. I thought that was a good sign. In the process of making a film, everything changes, and I thought it was one of my main jobs to try and remember what I started out to do. So the foundation is there in the script. But the actors and the entire crew add a whole other layer; they're full of ideas. And the problem is to sort out what are the good, new ideas, what are the good ideas that don't fit, and what are the bad ideas. In the maelstrom that is directing, it's not always easy to do that.

The scary part is that sometimes your whole idea about a scene will change while you're shooting it. You go with your instincts and pray that the day's filming is not a disaster. And you're constantly surprised. Sometimes you think a scene went completely wrong, and it turns out great. Other times you insist on making it exactly the way you preconceived it, and it's just dreadful. Then you try to figure out how to eliminate the scene.

Q: How did John Barry come to do the score for *Body Heat?*
A: I met several composers during production. When we'd meet, I just wanted them to talk about their reaction to the script. In fact, with all the key people on the picture, that's what our conversations would be about—how they perceived the script. I was less interested in the technical ideas about it. I wouldn't have been talking to them if I had not admired their work. Composers tend to have very detailed emotional responses to the material, and when I met John, I saw that his perception of the script was the closest to mine, and I trusted it.

The music is the most frightening aspect of the whole thing, especially if you're musically illiterate, as I am, because it's difficult to describe what you want. You feel presumptuous telling a composer what to do in a way that you're not hesitant to tell a cameraman. Essentially, he goes away and writes the entire score, and then the time arrives when you go into a scoring stage and it's costing around $2[illegible],000 an hour and you've never heard it. It's scary.

Q: What led you to choose Carol Littleton as your editor on the film?
A: I wanted a woman to edit the movie for a lot of reasons, but partially because of the sexual material. I wanted the movie to be erotic, and I wanted a female voice in at that moment when we were making the most vital decisions.

I met Carol, a wonderful woman, and she had the most perfect understanding of the script. When you enter the actual editing process suddenly, if you're lucky, you have a real partner. I had imagined that that period would be relatively calm, but it wasn't. I think any postproduction schedule seems short to the filmmaker, so the calm never arrives. Instead, all the anxieties flood back that you didn't have time for during production. You look at the movie and it seems terrible one day and it seems great the next day and you don't know. But if you trust your editors, if you trust their judgment and their perception of the world, then they're the perfect sounding board. Suddenly there are two points of view, and when they come into line, you start to have some confidence about your decisions.

Q: Are you less likely to put your stamp on a script if the idea is someone else's?
A: If you take pride in your writing, then you bring yourself to the script. Unless you're just so detached from the job in a way that I can't really relate to, then you're always going to be in anything you write. I think that *Raiders* and *Empire* and now *Return of the Jedi* are radically different because I wrote them. It doesn't mean that they couldn't have been just as good if someone else had written them, but they have my stamp on them now.

Q: How did you come to work with George Lucas?
A: What happened was that after about seven years of writing scripts, I finally sold two of them within a three-month period. One was *Continental Divide,* and, unlike all the other stuff I'd written, it was very much in demand. Four studios bid on it. Steven Spielberg read it and he said, "I'm doing a movie with George Lucas. Would you be interested in meeting George?" He showed *Continental Divide* to George and George liked it. I was called into a meeting. We talked for 20 minutes and stood up and shook hands and agreed to do *Raiders* together.

Q: With Lucas involved in three of the projects, were your own contributions pretty much the same?
A: My experiences with George and Steven on *Raiders,* with George and Irvin Kershner on *Empire,* and with George and Richard Marquand on *Return of the Jedi,* have each been different. In the two *Star Wars* movies it's really been George's story. I came into *Empire* after there was already

a draft. On *Jedi,* George had done a draft, which we changed radically. Then he and I really collaborated on the script. But basically, George's overall scheme is what I'm serving. With *Raiders,* it was very different because there wasn't much before I came into it.

George and Steven and I sat together for a week or so. George knew what kind of hero he wanted, he knew what kind of hat he wore, and he knew basically the geography of the thing. I had seen a lot of great adventure films, and I related to the spirit of those films. We sat around and created what amounted to an outline. It was a winnowing process—well, we can't have this and we can't have that and how are we going to get them from here to here and who are the villains and who are the supporting characters?

We wound up with a 100-page transcript, and I thought that I really had it made because I had never had any help writing my scripts and I had written seven scripts by that time. But when I read the transcript, I saw that there was an enormous amount of work to be done. All the specific decisions remained to be made. If there's anything to say about screenwriting, it's that when all the talk is done and all the brilliant ideas of everybody involved are presented, you go off alone and you have to make it work. To make it work, you have to be very specific about what's in a scene and how you get from one scene to another and how you get all the information you need for the movie into the movie—and still have it have some kind of flow, some dynamic, some delight to it.

Q: In projects like these, which depend so much on letting your imagination go, how far do you push inventiveness?
A: I'll give you an example. In the first draft of *Raiders,* the hero Indiana Jones is flying from the United States to Nepal. He's on the plane and he goes to sleep. There's a normal complement of passengers—a little old lady, some tourists, some Orientals. While Indy's asleep, the crew and all the passengers get up together, put on parachutes and tiptoe out of the plane, leaving him there alone. The pilot has locked the cockpit, and the plane is headed for Everest or some other notable mountain. He wakes up, looks around frantically and pulls out an inflatable life raft. He wraps it around his body while it's still uninflated and jumps out of the plane, pulling the inflation cord, and bounces safely down in the snow. Then he rides down the mountain using the raft as a sled. After we looked at it, we thought may be that was over the line.

Q: How did you get the opportunity to direct?
A: With *Raiders* and *Empire,* I wound up working for George for over a year. Everyone in town knew about *Continental Divide.* So everyone wanted me to write things. But it was time now, I felt, to direct. That was the reason I'd started writing screenplays in the first place. Once I decided that I was to direct next, it became easy to turn down everythig else.

Q: Were there any big surprises about directing?
A: Sure, lots. But I think the biggest for me was the extent to which the emo-

tional climate on the location and on the set would start to influence my perception of my own movie. You have to be careful about it.

Q: How do you feel about rehearsal?
A: It is *the* most valuable time you have with the actors. Once production starts, it's almost impossible to get extended private time with them. In addition, during that rehearsal period, you discover that you're the only one that sees the script your way, that no matter how much enthusiasm they have for the project, they're seeing an entirely different movie on those pages. You get to exchange your ideas about what that script is, and find that some of their ideas are better than your ideas. It's a great time to try out a lot of different ways of doing scenes; that's a luxury you don't have once production starts.

Actual production is antithetical to the working process of most actors, which is all about concentration and creating space and privacy and quiet. Film production is all about intrusion, about invasion of that privacy. The rehearsal time gives you a base so that within that chaos you have somewhere to start that isn't square one.

Q: Now that you're going to be involved more in directing, do you want to direct only your own material, or are you open to directing other people's?
A: I have never really liked writing. It's the loneliest work in the world. I hate being alone in a room, and I was alone all the time for seven years while I was trying to sell something. I thought, If I can ever get out of this writing racket, I'm going to hang around with people. And that's what directing is. I figured I'd direct other people's things, and other people can sit alone in a room. Unfortunately, what's happened is that I realized you give such a big chunk of your life to any movie that you've got to care passionately about it. It's very hard to find other people's material that stokes you so much that you say, "Here's a year and a half of my life." A lot of the stuff I've been offered I'd be happy to see in a theater—you know, invest two hours in it.

Q: So you're resolving the perennial battle between director and writer by dealing with just your material.
A: Screenwriting is problematical for me. If I thought that was all I could ever do and that I would constantly be turning over these works of love to other people and having them changed, I don't know how long I could do it. The fact of the matter is that there is no battle between the writer and the director. The director has won it. He will do with your script as he wishes. That's a problem if you have a lot of pride in what you're writing, if you invest a lot of yourself in your script. The movie comes out and there's the pain that *your* movie never got made; there's this other movie instead. But everyone says you wrote it, and they blame you for it anyway. So you're getting it from both sides. But it's the director's movie. I resisted that fact for years, but it's a fact.

And no matter what, a director doesn't make the same movie that you wrote. That doesn't mean that he's wrong and you're right. It's just when you look at the final film, those things that you wanted are not there, even if it's very close to what you wrote. Some people don't understand that. They don't understand that casting, that camera, that everything affects the meaning of that script. The tone is going to be different. That's why you can take any script and have two different directors make it and you get two radically different movies.

Q: What films and directors have influenced you?
A: A lot of writers and directors have influenced me. I think that Akira Kurosawa has meant the most to me. Without going into a long thing about him, Kurosawa is the Shakespeare of film; his films work on several levels at all times. They can be taken as pure popular entertainment, and then they can be skinned and peeled like an onion to find out what he's really talking about. He's used every genre for his own purposes, and he's worked entirely outside of genres. In addition, he has an incredible visual style, a wonderful writing sense. The movies are exciting. They're funny.

When I was a kid in West Virginia in the '50s, I was seeing just Hollywood products. John Sturges was an important director to me—*The Great Escape, The Magnificent Seven, Gunfight at the O.K. Corral.* Those movies had a big impact on me. I'm a great fan of Robert Towne's. I don't think there's a better screenwriter around; *Chinatown, Shampoo* are wonderful scripts that inspire you. When I was in college, I studied English literature. Conrad, Lawrence, Forster. Their novels, and the work of Fitzgerald and Bellow and Nabokov—that's what formed my ideas about good writing.

Q: Where do your scripts start? Is it plot or characters or ideas?
A: They start with characters, I think, but they tend to be about narrative and about drama. I started writing in college—at the University of Michigan. My training was in theater. I was taking playwriting courses, and I was writing theater and having it produced at the university. If you're trained the way I was, it's classical dramatic training, in which you learn how plays have been constructed since they started writing plays. I think that has served me very well in Hollywood because a lot of the people writing screenplays don't have that training. They're not interested in dramatic structure, and they don't have a literary background. Many young screenwriters today come from television: they grew up on television and they think the way narrative is presented on television is narrative, but it ain't. And so, if anything, I believe in classic dramatic construction, and I believe in the force and momentum that good narrative creates as it builds on itself.

Q: What sort of encouragement do you give to those who are still trying to get in?
A: [Screenwriter and director] Frank Pierson says that once he was thinking about giving up and a friend said to him, "You know, the only people doing it are the people who didn't quit." And that's really the whole thing. You have to get lucky at some point, but you can only get lucky if you are still on the road, and for each of us that road, that journey, is of a different length. The thing is to keep doing it and doing it, any way you can. And the closer

you can get to actually doing the thing you want to do, the better off you are, because the industry is so shortsighted. They don't ever look in another area to see where they could draw from. So it may not be terribly useful to become someone's assistant. They would never have let me direct if I had not said, "I am going to direct."

The thing I tell writers is: if you're going to take a job to live on, make sure it's a job that is impossible for you, really unpleasant. That way, you won't ever get seduced into thinking, I really want to do it all my life. That keeps you on track. If you hate what you're doing every day, it reminds you of what you want to do. □

Abstract Art and Middlebrow Modern

By KENWORTH MOFFETT

Significant new art is hardly noticed because the art world's attention is generally focused on fashionable contemporary art which crowds the salons of Paris, London and New York. But things are changing. "For almost 40 years," says the author, "our best contemporary art has been our best abstract art... . It has been called American-type painting, postwar abstraction, and post-Pollock abstraction. I call it the new abstraction." Kenworth Moffett is curator of 20th-century art at the Museum of Fine Arts, Boston, and the author of a study of Jules Olitski.

NEW art is always hard to see at first. In general, the newer it is, the less likelihood of its being rightly seen. It's just too unfamiliar. To become familiar it needs exposure and to be focused on. But this can't happen right away because a more available and fashionable contemporary art attracts the art world's attention. This has been true throughout the entire modern period. Until the 18th century, the audience interested in art was usually part of a small, cultivated, upper-class elite, and it usually liked the best art of its time. Exceptions were rare. The "fashionable" usually coincided with the best. Abbot Suger, who built Saint Denis and created the Gothic style, knew where to get the very best. So did Julius II and Urban VIII and Lorenzo de Medici.

But then art was thrown onto the open market; its audience became anonymous and much bigger. This changed audience has tended to like the fashionable *to the exclusion* of the best. Sometimes the best work receives attention and sometimes it sells moderately well, but it rarely becomes fashionable until it has been around for years. For it to be truly valued—to be recognized as the achievement it is—the merely fashionable or popular contemporary art that accompanies it must be reduced to its proper proportions. The major personalities have to be distinguished from the merely fashionable ones (Cézanne rather than Rosa Bonheur). For this to happen, the audience must attain the distance to be able to tell the really new from the merely fashionable. By then, however, new fashions have come along to obscure the best of the newest contemporary art. So the audience, or at least the overwhelming majority of it, is always behind, and this seems to be a permanent situation. It has already been with us for more than 150 years. This audience liked Carlos Duran, Cabannel, and Bonnet instead of Monet, Renoir, and Degas. It liked Henri Martin instead of Henri Matisse, Ben Shahn instead of Jackson

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Pollock, Henry Moore instead of David Smith. Modern audiences never seem to get it right when it comes to contemporary art.

Fashionable art, then, crowds out and obscures the best. Fashionable art is simpler and more familiar than genuinely new art. Also, there is much more fashionable art. Fashionable contemporary art is the most visible new art, the most exhibited, discussed, and reproduced. It is the most expensive new art, dominating the auctions as well as the shows and acquisitions of most of the museums that deal with contemporary art. It dominates the literature on recent art, and the salons, the official survey shows of contemporary art such as the famous Paris salon of the 19th century. Today, the salons are the Whitney Biennial, the Documenta, the Hayward Annual, the Venice Biennial, the Sao Paulo Biennial, the Carnegie International, the Rosc, and phenomena like the "Zeitgeist" show held recently in Berlin. What we see in the salons is what the professional audience (critics and curators) thinks is important, and this audience, or at least the great majority of it, is just like most of the non-professional audience: it likes fashionable new art best. Sometimes good new work does get into the salons, but it never amounts to more than a tiny minority of the work exhibited. Fads and fashions prevail.

The most successful salon art—the most fashionable of fashionable art—always makes a big assertion and is offered as a candidate for "important" or "serious" art, but it inevitably becomes a period piece when things get sorted out. A period piece is mainly of sentimental appeal and charm. It has "historical interest." At the opposite pole from the period piece is the masterpiece, the great work by the great artist. No one would ever call a great Rembrandt or a great Cézanne a period piece, but we experience the typical pictures of Rosa Bonheur, Bouguereau, and Alma Tadema, salon stars of the late 19th century, primarily as period pieces. They don't transcend their time, but succumb to it, and we're amused. But as art, as personal expression, a Bouguereau is banal and obvious. Indeed, its sheer obviousness is exactly what made it so popular in its time, and what makes it "camp" today.

Jasper Johns' famous paintings of targets and American flags are typical of today's successful salon art. Like Bouguereau's pictures, they are painfully obvious in their conception and lifeless in their handling, drawing, and color. Artistically, a Johns is very like a Bouguereau; it has only a different period look. The Bouguereau wants you to associate it with the old masters like Raphael, while the Johns is abstractly up to date. Today's fashionable art wants to look modern, and *modern* here means recent abstract art. Our salon art is a popularization and vulgarization of the best recent abstract art, just as in the 19th century salon art was a popularization and vulgarization of Renaissance and baroque art. Salon stars like Johns take their cue from abstraction, and, like our best abstract art, today's salon modern goes back to the late 1940s and a division of taste within the avant-garde, that is, the innovation-minded artists and critics. Most looked to Willem de Kooning for leadership. Charismatic, articulate, and European, he seemed more knowing than his rival, Jackson Pollock, who, while clearly a "genius," made paintings that looked freakish and kept himself apart. But de Kooning was only the magnetic center of the new art; Pollock was its artistic center. The future lay with Pollock, but no one then could see the quality of his pictures except for a few artists and the critic Clement Greenberg.

De Kooning sensed that something big was happening and, following Pollock's example, became broader and looser in his handling. The results were disastrous. De Kooning's pictures became confused and bombastic. Nonetheless, he continued to be seen as the *chef d'école* by almost all of the vanguard artists and critics. By the beginning of the '60s he had evolved the manner that has characterized his pictures ever since: thick oil paint, bright colors, and long "artful" strokes. His work has traditional light and dark accenting and often a figural or semifigural character. It is a simplified and more familiar version of Pollock's ideas and therefore easier to see and imitate. So it was that de Kooning became the "Pied Piper" of a new salon epoch. By 1959 Fairfield Porter could write that "the phrase abstract-expressionism is now seen to mean painting of the school of de Kooning." De Kooning gave the impetus to "Tenth Street" abstraction just as his "Woman" pictures helped spawn a return to realism. Next came pre-pop and pop, which were tidyings up of the "Woman" idea: flat, loud, commercial imagery plus the scale and brightness of the new abstraction. This was the formula that first put the new salon modern over in a big way in the early 1960s.

The neatness of pop signaled a shift in salon taste from the rough and painterly to a bright, bare, hard-edged look. This also came ultimately from the innovations made by the abstract expressionist generation, especially Barnett Newman. Minimal art, which began to appear in the salons at about the same time as pop but which became much more visible toward the middle of the decade, owed almost everything to Newman's ideas (not his best ideas either). Kenneth Noland and Morris Louis, two of the leading abstract painters of the "second generation," received attention in the salons and museums in the early 1960s. Their work was never as expensive or fashionable as that of the well-known pop or minimal artists. But their pictures could be read graphically and thus could be assimilated to the hard-edged, bright, and simplified salon taste of the period. Helen Frankenthaler, who showed the way to Pollock, didn't become fashionable until the late 1970s, and other major second-generation figures aren't visible yet. This pertains especially to Friedel Dzubas and Jack Bush, two painters whose work didn't quite fit the salon taste of the early 1960s. (Neither has a picture in the Museum of Modern Art, and Dzubas hasn't been seen in the Whitney Annual or Biennial in 25 years!) The best artists who came along after pop took off in 1962 have never become fashionable. Jules Olitski came the closest in the mid- to late 1960s, but since then his work has been the most "out" of "out," at least in New York and Europe. Larry Poons' good dot pictures of the early '60s were quickly approved of by arbiters of pop and minimalist taste, but his much better "cascade" paintings of the 1970s remain as "out" as Olitski's recent work. Important younger artists like Michael Steiner, Darby Bannard, Darryl Houghto, Sandi Slone, and John Griefen haven't been seen at all in the salons, even though they have shown commercially in New York for years. And many of the best abstract painters in this country, Canada, and England aren't even seen commercially in New York—let alone in Europe. Instead there are the "trends": post-minimal, earth art, concept art, performance art, process art, pattern painting, new image painting, air brush realism, punk painting, the new Italians, the new Germans, and many more. Behind these trends are simple-minded ideas about artistic originality and innovation—a lack of understanding of modern art and especially of the work of Pollock's generation. Beer cans, stuffed goats and camels, human excrement, self-mutilation, and almost everything else have been offered in the salons as serious, professional work. Nothing could be more shallow and meretricious than these ideas. But today's salon offers many of them together, giving contemporary art a varied, energetic, and entertaining look, even though, considered individually, most of what is shown is artistically simple-minded.

There are salon versions of representational art like the work of Alex Katz, Phillip Pearlstein, Chuck Close, the pop artists, the photo-realists, and most recently the neoexpressionists like Julian Schnabel. All combine conventions of recent abstraction (especially large size and bright color) with representation in such a way as to trivialize rather than extend the tradition of working from nature. Then there are salon versions of pure abstraction, like the work of Frank Stella, Ellsworth Kelly, Al Held, and the minimalists—Donald Judd, Richard Serra, Carl Andre, or Agnes Martin. (Ad Reinhardt belongs here too.) Compared with the works of our best abstract artists, the works of these salon abstractionists are coarse and brittle parodies, pedantic expositions of the obvious. But the insistently simplistic is characteristic of successful salon art; this is what makes it so visible—and recognizable—to today's art audience.

Taste for the trends took shape in the late '50s and early '60s and now dominates the contemporary art scene. It is part of the expansion of the audience for modern art that began at that time. It was the time when historical modern, the modern art of the pre-World War II period, became blue chip, and the time when the abstract expressionist generation was first recognized by the art establishment here and abroad. As earlier modern art became popular, so did American contemporary. Thirty years ago New York had only five or six galleries that regularly showed contemporary art; today it has nearly 200. The number of museum exhibitions, periodicals, and college courses devoted to contemporary art increased geometrically during this same period. The huge new audience is very broad and unsophisticated. It wants easy excitement and obvious kinds of activity and diversity. Serious modern art (art that takes itself seriously) comes in relatively small quantities and develops over generations; it can't hope to satisfy an audience that wants so much so fast. The result is a "middlebrow" modern art, a popularized version that has an obvious kind of variety and that moves quickly.

Of course, it is a wonderful thing that so many more people are now open to the art of their own time. It stands to reason that any broadening of interest into a highly sophisticated area of culture like ambitious painting and sculpture would initially result in a decline of standards. Our middlebrow modern may turn out to be a necessary stage in the acceptance of abstraction. But once people develop a taste for our best contemporary art, today's salon modern is pretty hard to take. It looks like a terrible decline of taste. Was the salon art of the 19th century as bad as today's salon modern? Probably not. Craft and tradition guarantee a certain level of quality. Now anything goes, so long as it is "in." Never has fashionable art been so amateurish and dilettantish.

This is not to say that today's salon art doesn't have its small merits and minor triumphs just as 19th-century salon art did. At its best, pop art is lighthearted decoration, more at home in a disco or a chic hair salon than in an art museum. As pictorial art, the prints of pop artists like Rauschenberg, Johns, Dine, Oldenburg, Warhol, and Lichtenstein are usually better than their paintings and sculptures. Minimal art has a clean simplicity of design, even if it is bland and repetitive and rarely shows any feeling for proportion. I find that Duane Hanson's sculptures have a creepy fascination akin to a feeling I get in a wax museum, and some of the photo-realists do sensitive watercolors. William Wegman is a good stand-up comic. But even the very best examples of the trends seldom go beyond the minor, the odd, the cute, or a good basic design—at the level of, say, a good *New Yorker* cover, a good stage set, or an imaginative window display. In fact, these areas of applied and commercial art regularly produce things that have more real dignity, taste, invention, and sensitivity than the "fine" art featured in our salons. And salon modern has been getting worse. The best art is hardly seen at all anymore in the salons, and the current trend—punk, new wave, or neoexpressionist painting—is a kind of choked and muddied nastiness, worse than pop ever was.

But if our salon epoch is an especially decadent one, we must keep the central point in view: it has all happened before—at least in scheme, in general outline. The most blatant and well-known instance of fashionable art's obscuring the best new modern art is, of course, France in the last half of the 19th century. Never was new art greater and never was it more difficult to see. This art, impressionism and postimpressionism, unfolded over several generations and half a century, between Manet and Matisse. It involved a score of major figures, many of them friends, and all of them influencing each other's work. They created an art of great force, refinement, and range. Yet at no time in the 19th century were they considered more than a minor trend by Europe's art establishment.

Today's art world thinks itself too sophisticated to be fooled again. It is now dominated by open-minded liberals who want novelty and are broadly pluralistic. But an accepting liberalism isn't really any more sophisticated an attitude toward innovative art than a rejecting conservatism is. Only connoisseurship, comparative evaluation, is useful here, and connoisseurship reports that there is a nearly exact parallel between today's contemporary art and that of the late 19th century. We, too, have a bold new modern art, full of life and color, that is being diminished and obscured by the very big, very bad art of the salon.

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For almost 40 years our best contemporary art has been our best abstract art. Here is the cutting edge, the true avant-garde, the real modernism. Here is the contemporary equivalent of impressionism and postimpressionism. It has been called American-type painting, postwar abstraction, and post-Pollock abstraction. I call it the new abstraction. These terms all register the great change that took place right after World War II. Taking advantage of the dislocation caused by the war, the so-called abstract expressionists seized the leadership of the international avant-garde. Their most important contributions to abstraction were a bold, new scale and the investment in dramatically unorthodox ways of working. They pushed beyond the point of no return the centuries-old traditions of easel painting, oil painting, and monolithic sculpture. The achievement of this first generation of the new abstraction was a significant one both for the development of modern art and for the history of American art. With them, abstract and American art came of age together.

They were a large group, too. We can name at least 11 major figures, each of whom has something important to say: Jackson Pollock, David Smith, Adolph Gottlieb, Hans Hofmann, Clyfford Still, Mark Rothko, Barnett Newman, Robert Motherwell, Arshile Gorky, Willem de Kooning, and Franz Kline. Whatever we determine were the enabling circumstances, their appearance in the 1940s will always be seen as a great bursting of creative energy in American art. Stylistically, these painters have always been seen as forming two groups: those who wanted dramatic movement and a broader kind of drawing (Kline, de Kooning, and Pollock), and those who aimed at romantic suggestiveness through warm color and large simplified designs (Still, Rothko, and Newman). The work of the others—Gottlieb, Motherwell, and Hofmann—falls somewhere in between and shares features of both groups. The first group, especially Pollock, was radically experimental with the medium and freed painting of assumptions that had lasted for hundreds of years. The second group evolved the basic idea of the color-dominant abstract picture (even if it didn't come close to exploiting it).

As for sculpture, David Smith was the first great energetic talent to devote his entire career to the new constructed sculpture invented by Picasso and Gonzalez. There were other talented contemporaries—Seymour Lipton and Herbert Ferber—but no one was even close to Smith in the number and power of his ideas or in the way he expanded this new tradition. Almost alone Smith brought abstract constructed metal sculpture to fruition.

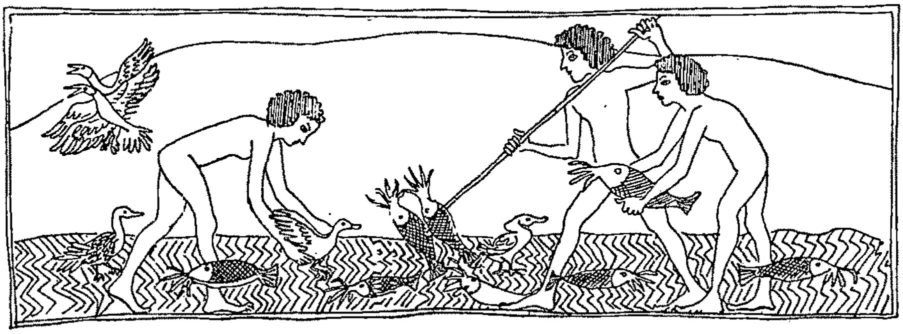
Looking back on the "first generation" from the point of view of subsequent developments, we cannot help noticing that the work of so many of these artists shows a sharp decline after the mid '50s. Only Gottlieb, Motherwell, Hofmann, and Smith worked well after that. Also, some of the greatest innovators of this generation—I'm thinking of Newman, Still, and Rothko—did surprisingly few first-rate works. Since it was a pioneering generation it was also an isolated and neglected one, at least at first; this led to self-dramatization, high flying, and defensive rhetoric, usually about the "subject matter" or the supposed mythical content of their abstract pictures. And self-conscious "meaning making" (as opposed to direct, sensuous involvement with the materials) is, I think, what accounts for much that is dead or depressing in the work of this generation: Rothko's murals in the Houston chapel and most of his late, dark pictures; almost all of Still's very large pictures; most of Newman's work after 1953, including most of his stagy *Stations of the Cross* series. So, too, empty rhetoric is the main expressive feature of de Kooning's work of the past 30 years, or of most of Kline's paintings of the late 1950s. Abstract expressionist drama often turned into melodrama, and it makes some sense to talk of these painters as "primitives" of new abstraction, and as a "sacrificial generation." But their real achievement was to set out the main ideas of the new art and create its first masterpieces. They showed the way.

A second generation began to appear in the 1950s. This group didn't come along together, and it took a long time for it to develop and to come into focus. But it too has turned out to be a fairly large group, whose leading figures are Helen Frankenthaler, Morris Louis (who died in 1962), Kenneth Noland, Friedel Dzubas, Jack Bush (who died in 1977), Jules Olitski, Stanley Boxer, Robert Goodnough, Ludwig Sander, and Anthony Caro. There are also late bloomers such as Cora Ward. The most noticeable feature of the painting of this second generation is the great emphasis given to color. Also, these painters have shown a new confidence in dealing with large scale. Most use a staining process or at least paint thinly, and all have adopted a very experimental approach to materials and working procedures, which they inherited from Pollock's generation. The second generation was the first group of painters to turn to the new acrylic paints, which almost all of our leading abstract painters use today. This appears to be the most important change in the medium of painting since oil paint became popular in the 16th century; it was certainly one of the fastest. By the early '60s most of the best second-generation painters had switched to acrylic paints. Quick drying and flexible, the acrylics seemed made to order for the direct, spontaneous ways of working evolved by the first generation. Beginning with Helen Frankenthaler, Morris Louis, and Kenneth Noland, abstract painters have had a continuing creative dialogue with the manufacturers of acrylic paint. Picture-making and the technology of paint manufacture now evolve together.

Direct improvisational methods are also favored by the sculptors of the new-abstraction art. Instead of the laborious traditional methods of carving or modeling that, like the hand-held brush and oil paints, were devised to make representational images, today's abstract sculptors proceed by bringing together unit parts, usually of steel, that are easily joined by techniques such as welding or bolting. This was Smith's approach, adopted by Caro, who, even more than Smith, revolutionized the medium of sculpture. Caro did for sculpture what Pollock had done for painting—he finally liberated it completely from the last assumption of representational art.

The leading figures of the second generation haven't faltered as the abstract expressionists did. Their attitude toward their art is more matter-of-fact and professional, with little of the self-dramatization so typical of the earlier generation. With the second generation, abstraction has become a fully extroverted and empirical art; they have built brilliantly on the foundation laid by the first generation and have expanded abstract art beyond anything that the first generation imagined it to be.

Recently, there has appeared a third generation or wave of abstract artists now in their 30s or 40s (a few are in their 20s). In the last six or seven years it has begun to look as if this will be a very large group. Indeed, since the middle '70s, there has been something like a quantum leap in the number of good abstract artists. So much is happening so quickly that it's hard to keep abreast of it all. I hear about or see the work of a new, aspiring talent every few months Certainly, there is much more to look at than there was even five years ago. There is even much more good student work. Abstract art has become altogether more solid and assured. At the same time, it continues to gain momentum and to produce great things. Postmodernist rhetoric notwithstanding, we are experiencing a florescence of modern art. □



Mapping in the Space Age

By JOHN NOBLE WILFORD

"Mapping from space," writes the author, "affords a new view of the world and its natural resources, with ecological, economic and political implications that are now only beginning to be appreciated. The new technology can help in the search for new sources of minerals and petroleum, in taking inventory of crops and their condition and in determining the depth of snow cover as a way of predicting floods." John Noble Wilford, who covers space and science for *The New York Times,* is the author of *The Mapmakers.*

HUCKLEBERRY FINN, shrewd in so many ways, had trouble understanding the symbolic nature of maps. In "Tom Sawyer Abroad," Mark Twain writes of Tom and Huck's being up in a balloon, wondering if they have passed over Illinois. Huck insists they have not, and Tom asks Huck how he can be so sure. "I know by the color. We're right over Illinois yet," Huck says. "And you can see for yourself that Indiana ain't in sight."

"What's the color got to do with it?" asks Tom.

"It's got everything to do with it. Illinois is green, Indiana is pink. You show me any pink down here, if you can. No, sir; it's green."

"Indiana *pink?* Why, what a lie!"

"It ain't no lie; I've seen it on the map, and it's pink."

This is too much for Tom. "Seen it on the map! Huck Finn, did you reckon the states was the same color out of doors as they are on the map?"

Huck, unfazed, sticks to his literal-minded view of cartography. "Tom Sawyer, what's a map for? Ain't it to learn you facts?"

Huckleberry Finn's delightful confusion came to mind not long ago when the National Aeronautics and Space Administration displayed some of the latest, most striking mapping images of the world as seen from space. They were produced by the new technologies of remote sensing and electronic data processing that have been transforming the ancient art and science of mapmaking. Remote sensing, by airborne and spaceborne radar and by instruments known as multispectral scanners, provides a new means of gathering prodigious amounts of information, rapidly and repeatedly, for making and revising maps. It complements and to some extent replaces aerial photography and the labors of foot-slogging surveyors, which can provide greater detail of topography but which cannot provide as comprehensive coverage in as short a time. And the enormous appetite of computers for ingesting and digesting data makes it possible to convert remote-sensing images into maps. In a grow-

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ing number of instances, computers are replacing conventional paper maps with digital maps in the computer's memory. While the information can be used to print out a more or less conventional-looking map, the big advantage of this system is that it can store in digital form information that can be quickly changed to take new geographical features into account and can be used immediately to produce a totally revised map or a map showing only specific features in a region, such as, say, all the four-lane highways in Pennsylvania.

These new technologies have made it possible for the first time to map the entire world, from pole to pole, and expose every part of every land to continuous scrutiny. They are the basis for the "spy-in-the-sky" satellites deployed routinely by both the United States and the Soviet Union, satellites that supply military strategists with the means to locate with incredible accuracy potential targets for missile attack.

On the other hand, these same technologies tend to be stabilizing influences on world affairs because of their value in monitoring conformance with arms-control agreements and reducing the chances that one side will act hastily through miscalculation of the other's capabilities or intentions.

But the application of these technologies goes far beyond military reconnaissance. Mapping from space affords a new view of the world and its natural resources, with ecological, economic and political implications that are now only beginning to be appreciated. The new technology can help in the search for new sources of minerals and petroleum, in taking inventory of crops and their condition and in determining the depth of snow cover as a way of predicting floods.

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For Huck Finn it would have been sufficiently flabbergasting to contemplate NASA's new remote-sensing multispectral scanner, particularly its color images. No colors in the images are true to the out-of-doors, or even to usual maps. Much of Indiana runs to pink or red, which would have been satisfying to Huck, but so does Illinois. So do all surfaces of the earth covered with vegetation. And the Mississippi River appears deep blue, a misrepresentation that Huck, with his experience rafting the muddy waters, would have found laughable. Elsewhere, urban sprawl is delineated in smudges of grayish-blue. Bare land shows up as white, green or brown, depending on soil conditions; some clays rich in iron oxides stand out in yellow and orange. Variations of other hues denote differences between clear and polluted water, deciduous and coniferous forest, rice and soybeans, healthy and diseased crops.

This is the world as it looks through the electronic eyes of a robot beholder, the Landsat spacecraft, which carries the scanner. More than one million of these images have been produced since the first of four Landsats was launched into earth orbit in 1972, an output that constitutes an extraordinary portfolio of all parts of the world seen in great detail in all seasons, including hitherto largely unmapped areas such as the Arctic and Central Asia. The shapes of the land may be familiar: the continents and coastlines, the boot of Italy and the hook of Cape Cod, the deltas of the Nile and the Mississippi. But there is more there than ordinarily meets the human eye.

"These are not just pretty pictures," Samuel W. Keller, a NASA official, explained at a showing of Landsat 4 imagery. Technically, they are not photographs at all. They are multispectral images. Photography, with an Instamatic or the sharpest telescopic lens, ordinarily makes pictures of features by registering their reflections of light visible to the human eye. Landsat's scanning sensors not only see visible light in the yellow and red wavelengths but also detect radiation in the region of the electromagnetic spectrum beyond red and thus beyond the rather limited perception of the human eye. This is known as the near-infrared region. Hence Landsat's multispectral vision, and its unusual ability, as Huck would say, to "learn you facts."

Since different objects—animal, vegetable and mineral—reflect sunlight in different ways, each is said to have a "spectral signature." Sandstone reflects light in the infrared differently from shale, wet soil differently from dry soil, corn differently from wheat, and so forth. These otherwise invisible signatures are discernible, after careful analysis, from the image data produced by Landsat and processed by computers on the ground. In this processing, what is essentially invisible is made visible through the use of "false" colors that give these images such an unfamiliar aspect.

Sometimes the effect approaches or, depending on taste, surpasses modern art. In a test of the other new method of looking at the earth from afar, the imaging radar system carried by the space shuttle Columbia profiled great swaths of land with remarkable results. In this system, radio signals are bounced off the earth and the returning echoes are processed into images. Rugged mountains and sinuous valleys stand out in the radar imagery as on a three-dimensional relief map. A mosaic of the Great Salt Desert of northern Iran, when processed in false color, seems to cross the boundary from science to Willem de Kooning and Jackson Pollock. It becomes a painting fluent with marbled, swirling patterns in burnt orange and blue, ancient sediments in reality, and spreading patches of strong red and blue, the dry salt and clay deposits.

Esthetics aside, the new technologies are changing the look of maps in a more fundamental way. Nowhere is this better illustrated than in the electronic maps that will be carried and consulted by the cruise missiles. These maps no more resemble familiar paper maps than a computer data tape does the Gutenberg Bible.

Like a traveler on a more innocent journey, the cruise missile will have tucked in its onboard computer a "map" of the route it is to follow and of its ultimate target. This is a magnetic tape containing in digital form such map information for the route as ground elevations and coastlines as well as forests, large buildings, antennae, power lines and other vertical obstructions. The Defense Mapping Agency is well on the way to converting to digital form the maps for more than half of the world's land surface. That is, existing maps are being disassembled and their components—contour lines, roads, bodies of water, cities, etc.—identified by number codes. This is called digitizing. New mapping data come not only from Landsat but also from what the Pentagon calls "other sources," which presumably include the even more sophisticated secret digital-imaging reconnaissance satellites (KH-11, or Keyhole). These data originate as electronic pulses that translate to computer numbers, and so are more readily incorporated in the agency's digital data bank. Digitizing has been a monumental task, and will cost more than $1 billion by the time it is completed.

With one of these "memorized" maps, according to the Defense Mapping Agency, a cruise missile should be able to fly many hundreds of miles at treetop level, to avoid radar detection, and find its target with astonishing accuracy. For much of the flight the missile follows a preset course. Then, at specified points, the missile's radar altimeter senses the ground below and compares its readings with the "map." The missile thus "sees" where it is and, if necessary, adjusts its course to the next checkpoint. The winged missile, obeying messages from its map and radar, undulates with the contours of the land. The closer it gets to the intended target, the more frequently it consults the map. Although much about the final approach is classified secret, and critics question the missile's reliability and vaunted accuracy, some arms experts in Washington say that the cruise missile is supposed to have a 50 percent chance of delivering its nuclear warhead to within four to six feet of a target.

Looking to the future, Maj. Gen. Richard M. Wells, director of the mapping agency, says, "Our goal is an all-digital capability, all the way from acquisition of data to their publication as maps or other uses." By the 1990s, perhaps, the D.M.A. would have the whole world reduced to computer digits and stored in a vast library of magnetic and optical disks. Conceivably, each time a highway was extended a few miles, a new housing complex went up or a forest was cut down, some computer numbers would be added or revised. It would always be possible to have an up-to-date world cartographically.

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Morris M. Thompson, a research cartographer at the United States Geological Survey in Reston, Va., shies away from using the word revolution to describe cartography's new-found capabilities. "Almost at any time in the last 40 years," he says, "you could have looked at what was happening in mapping and called it revolutionary. It's an evolution rather than a revolution. All those gadgets and systems are the result of long, sweaty hours, a little progress here and there, with one thing building on another every day." His view reflects the temper of most cartographers, who emphasize the incremental nature of what has occurred in their profession.

Aerial photography, for example, may be said to have begun in 1858 with a feat by Gaspard-Félix Tournachon, a Paris photographer who called himself Nadar. He loaded his wetplate apparatus into the basket of a balloon and cast off to an altitude of some 250 feet, where he succeeded in taking a picture of an entire village. Honoré Daumier, the artist, drew a caricature of a balloonist with a caption saying that Nadar had elevated photography to the "highest" art.

World War I brought together the airplane and photography, leaving no doubt that the two technologies had a joint future. Aerial photographs, like the new radar and multispectral images, are not in themselves maps. They are the raw material of maps. Converting them to maps requires a number of complex mathematical steps to determine scale and pin down the elevations, longitudes and latitudes—the precise locations—of features in relation to each other and to the rest of the world. This procedure, known as photogrammetry, is yielding to varying degrees of automation today, but it used to involve hours upon hours of work with stereoscopic plotting instruments. Overlapping photographs of the same terrain, each seen from a slightly different perspective, produce a three-dimensional model from which map information can be extracted.

When the space age dawned, in 1957, little thought was given to its potential impact on mapping. Many experts assumed that the earth's atmosphere would probably have a blurring effect and preclude map-quality photography from space. The early astronauts soon proved them wrong.

As he approached the end of his Mercury orbital flight in 1962, John H. Glenn Jr. remarked, "I can see the whole state of Florida just laid out like on a map." He could see whole what generations of mappers had had to piece together from the ground or low-altitude aircraft. Even more revealing, and tantalizing, to mappers was L. Gordon Cooper Jr.'s experience on the last Mercury flight, in 1963. More than 100 miles over Tibet, the astronaut reported, "I could detect individual houses and streets." Comparing existing maps, years out of date, with some pictures he had taken, cartographers easily identified unmapped mountains in Tibet, mislocated lakes and the perimeters of ancient lake beds. From this came a revised map of Tibet and a growing impatience to exploit space flight's mapmaking potential.

This led, after years of bureaucratic infighting and budget constraint, to the Landsat program. The Defense Department had already developed and deployed advanced remote-sensing instruments on its various reconnaissance satellites. These included telescopic cameras with such sharp eyes that they could discern not only missile sites and troop movements but the painted lines in parking lots and, it is said, even the license-plate numbers on Moscow automobiles. More recently, military satellites, like Keyhole, have replaced photography with electronic sensors that detect variations in light intensity and convert these into images of extraordinary clarity. But these are secret programs, and the technology that was cleared for use on the Landsats was purposely not as good as it could have been, since it was intended as a basically nonmilitary tool. The Pentagon did not want the Russians to know what the United States could actually see from space.

Three virtually identical Landsats were launched, in 1972, 1975 and 1978, under the direction of NASA's Goddard Space Flight Center in Greenbelt, Md., and their performance measured up to the most optimistic predictions. From 570-mile-high polar-crossing orbits, the spacecrafts' multispectral scanners produced a continuous stream of images. All types of specialists eagerly pored over the incoming images and liked what they saw. They liked the comprehensive and repetitive coverage. Each image, taken along a 115-mile-wide swath, covered 13,000 square miles of land surface; an airplane would have had to snap 1,000 pictures to encompass an equal amount of land. With some 30,000 images, moreover, a Landsat could record the whole world every 18 days.

The broad view appealed to geologists, even to those who had been skeptical at first. "I didn't have great hopes for this electronic stuff," recalls Dr. Paul D. Lowman Jr., a Goddard geologist who felt more comfortable with "real" photography. But in no time Dr. Lowman discovered in the Landsat imagery many previously unmapped fractures branching off the San Andreas Fault in California. Other geologists revised maps of mountain ranges and spotted areas of extensive fracturing in Alaska that may be associated with mineral deposits. Oil and mining companies rushed to buy the images; some major oil discoveries, it is rumored, can be attributed in part to Landsat data.

Agronomists established that they could take quick inventories of crops. In early tests, they found that Landsat images could discriminate among 29 separate types of vegetation in Arizona and could tell the difference among California fields that were fallow, freshly plowed, newly sown or bearing crops. The Government now routinely uses Landsat data in forecasting the Soviet Union's trouble-plagued wheat production. More than 100 nations, some with their own receiving stations, make use of Landsat data to keep track of their crops, forests and water resources as well as to produce some of the first reliable maps of their hinterlands.

Mapmakers, like the geologists, had their initial doubts about Landsat. "God knows, I was a skeptic, but I was dead wrong," says Dr. Alden P. Colvocoresses, another research cartographer at the Geological Survey. A wholehearted convert now, he displays on his office wall the chart showing a previously unmapped Indian Ocean reef that was detected by Landsat. It bears the name Colvocoresses Reef. He rhapsodizes about a tiny island off Labrador that Landsat put on the map for the first time. It bears the name Landsat Island. He concedes that surveys from aircraft produce images with clearer detail, at resolutions of a few feet or inches. But Landsat, he notes, covers more ground more quickly and more often; three images, taken in less than one minute, brought forth a photomap of New Jersey. Dr. Colvocoresses also concedes that it is impossible to extract contours from Landsat imagery. He emphasizes, instead, the satellites' usefulness in map revision. Once an area has been topographically mapped by more conventional means, the major mapping problem is not land forms, which change little, but keeping up with changes in cultural, or manmade, features such as roads and buildings, which change too rapidly for ordinary mapmakers.

The first two Landsats have long since ceased operations. Landsat 3 stopped functioning in March and was put in standby mode. Last July it was joined by another, Landsat 4. This spacecraft is even more to the cartographers' liking. The spatial resolution of its imaging systems is three to four times better than that of the previous Landsats, and it can observe more subtle variations in light intensities reflected from the land. Each of the sensors in its primary imaging system has a gray scale of 256, compared with 64 for the earlier Landsats. That is, each of its sensors responds to 256 variations in light intensity and encodes the results in electronic digits, each number representing a picture element, or pixel. All the pixels are assembled through computer processing to create the images.

Landsat 4's enhanced capability comes from its new set of sensors known as the thematic mapper. In addition to its greater resolution and sensitivity to light contrasts, the instrument can see more because it measures reflected light in six wavelengths, four of them infrared, as well as in a thermal channel for taking surface temperatures. In cartography, a thematic map is intended to serve some special purpose or to illustrate a particular subject, in contrast to a general map on which a wide variety of phenomena appear together. The theme can be soil or vegetation distribution, glacial flows or snow cover, geologic faults, land-use patterns, all of which are the stock in trade of Landsat mapping.

With the thematic mapper, Landsat images reveal in finer detail street patterns, individual buildings and specific aspects of fields such as soil variability. In new images of the Washington area, for example, bridges, streets, airport runways and even bike paths, through computer enhancement processing, are discernible; the Capitol shows up as a blue rectangle surrounded by red, the false-color for vegetation and not a political or fiscal statement. "Where there is a difference in the succulence of vegetation, we can discriminate that and we could not do that before," says Dr. Vincent V. Salomonson, the chief Landsat scientist. "This allows us to separate corn from rice and rice from soybeans, and so on."

Landsat's future is uncertain, however. The Reagan Administration wants to turn Landsat over to private enterprise, even though remote-sensing experts warn that a viable commercial market for Landsat data is at least a decade away. The Communications Satellite Corporation, the logical purchaser, agreed to buy Landsat only if the Government would throw the weather satellites into the deal. An announcement of this proposal last March provoked a tempest of Congressional protest, leaving the fate of the Landsat program much in doubt.

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As observant as Landsat is, its images are virtually useless to topographic mappers interested in the texture of the land. For this, they are looking with rising expectations to a sophisticated version of radar flown in aircraft and more recently in spacecraft. The system, known as side-looking imaging radar or synthetic-aperture radar, involves sending pulses of ultra-high-frequency radio signals toward a target and then detecting the faint echo that is reflected back to the aircraft or satellite. A rough surface will reflect more radio energy than smoother surfaces. Mountainous terrain and lava flows, for instance, will show up as bright sources in a radar image. Analysis of the time it takes signals to make their round trips gives a measure of the relative elevations of various ground features. The echoes are recorded on film in a holographic fashion and are then transformed, using lasers, into images that give the illusion of three dimensions. The final product is a photograph from which maps, particularly geologic and topographic maps, can be fashioned.

In the 1960s, imaging radar was introduced to military aircraft for all-weather targeting and reconnaissance work. Another of radar's attributes is that it can function night or day and see through clouds. The most ambitious and successful cartographic application of this technology came in the 1970s when Brazil, with the help of American contractors, conducted an airborne radar survey of the poorly mapped Amazon Basin, more than half of the nation's territory. A previously unmapped river, several hundred miles long, was discovered, and a region marked out as a national forest reserve was found to be savanna.

The first civilian imaging radar carried into earth orbit was aboard an oceanographic satellite named Seasat, which was launched in 1978. Although Seasat operated less than four months, because of a malfunction, scientists and cartographers saw enough in the data to be encouraged and amazed. The survey confirmed that the surface of the ocean has contours like the land. At some places it is as much as 600 feet higher than in others. These bulges and dips occur because of gravitational differences resulting from an unequal distribution of mass in the earth's interior or, in more subtle instances, because of corresponding hills and valleys of the ocean floor beneath. A seamount two miles high raises the ocean surface above it about three feet. Taking this information from Seasat, scientists at the Jet Propulsion Laboratory in Pasadena, Calif., constructed a map of the world's sea floors that will likely serve as a guide to future explorations and provoke some revised thinking about global geology. Similarly, Dr. William F. Haxby at Columbia University's Lamont-Doherty Geological Observatory is perfecting what he calls "geotectonic imagery" from Seasat data, a technique that yields maps of submarine mountains, ridges, trenches and basins in almost dry-land detail.

A similar radar system, designed primarily to survey land, rode in the cargo bay of the space shuttle Columbia on its second mission in November 1981. Some of the resulting images were overlaid with Landsat images to highlight the complementary nature of the technologies, a mixing of radar's sharp view of terrain relief and Landsat's multispectral view of surface chemistry, as in the kinds of rocks and vegetation. The combined images in false color can be dazzling, as well as informative.

But the most arresting discoveries to come out of the preliminary analysis were the shuttle radar's observations beneath the Sahara sands. In extremely arid regions, it was found, the radar signals penetrated 6 to 10 feet—sometimes 15 feet—below the surface through loose, dry sand, often until they hit bedrock. Crossing over the Sudan and southern Egypt, the Columbia's radar produced images revealing buried traces of rivers that once flowed there and carved out valleys as broad as those of the present Nile. Carol S. Breed of the Geological Survey in Flagstaff, Ariz., was the first to see this. Geologists later bored holes into the desert and confirmed the existence of an ancient drainage system and found buried sites of human settlements from the time when the Sahara was less arid. Reporting the discovery in the journal *Science,* the team of radar experts concluded: "The potential for mapping ancient drainage patterns—and, by inference, potential sources of near-surface ground water—is sufficient to arouse excitement among earth scientists, who now have a new means of exploring the deserts of the earth."

One of the scientists, Dr. Charles Elachi of the Jet Propulsion Laboratory, says that in future experiments from the space shuttle the imaging radar system will be tested in different radio frequencies and at different viewing angles.

The oblique angle of the radar beam, like the angles of early or late sunlight, produces more sharply etched images of mountains and other relief. A more advanced version of the radar is to be flown on a shuttle mission next year. With soaring confidence in radar's mapping potential, Dr. Elachi declares: "We have the technology and the ideas. We have the platform, the space shuttle. With two or three shuttle flights in polar orbit, we could map the topography for the whole world."

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What is happening with multispectral sensing and radar may be evolutionary, as the Geological Survey's Morris Thompson suggests, but the way the new mapping information is being handled by computers approaches the revolutionary. It represents more than an increment of progress; it is a vaulting stride toward capabilities that would have been inconceivable a short time ago. This not only changes the way map information is gathered, but the way maps are produced, by automation, and the very definition of what a map is.

Digitization is the key. Most of the satellite map data arrive in the form of a computer's numerical language, a stream of digits. But existing maps must be converted to digits, a process akin to unmaking a map. So far, it has been a largely semimanual process. To convert a map into numerical form, an operator moves a hand-held sensor over the surface of the map to encode contours, boundaries and other features. More fully automated digitizing systems are coming into use at the Geological Survey and the Defense Mapping Agency. A paper map or certain images, placed on a rotating drum, are scanned by light-sensing devices that reduce the entire contents to digital form and store this in a computer. A typical topographic map is thus broken down into approximately 1.1 million data points, and that merely for elevations. Technicians then call up the map images on video screens for editing or revising. Maps extracted from the digitized data can be generated at any scale desired.

The Geological Survey last year completed its first digital cartographic data base, a set of standard magnetic computer tapes that contains the outlines of boundaries, roads and railroads, streams and other basic map features for the entire United States. A single tape of selected features for one of the 21 regions sells for $100; the entire data set costs $6,300. The first of the survey's topographic maps to be produced by computer, a five-color chart of the Birch Tree, Mo., area, was published last August.

Even more extensive is the Defense Mapping Agency's effort along these lines. This little-known organization, with 9,000 employees, primarily in Washington and St. Louis, started in 1974 to computerize the entire world, looking toward the "all-digital" production of maps. Often the information was never converted to maps in the conventional sense. The data became terrain models used in training simulators so that pilots could "see" what they were "flying" over. Or the digitized map data became critical elements in the "smart" guidance systems for cruise missiles or the Pershing II missiles. A canister containing several digital maps for routes to several potential targets is loaded into the missile, and just before launching, the missile is "told" which map to follow. Because these military projects had priority, much of the agency's effort to achieve a more generalized computerized mapping capability was sidetracked until now.

It was probably just as well, for the D.M.A. was facing what appeared to be an insurmountable data storage problem. To convert the map of the world to digits and store it on magnetic tape would have required a building five-eighths of a mile cubed just to hold the tapes, according to Lawrence F. Ayers, a deputy director.

A few years ago, Morris Thompson wrote about the changes in cartography between 1950 and 1975 and sought to forecast what surveying and mapping would be like in the year 2000. Distance measurement in surveying, he noted, passed in that time from steel-tape techniques to electronic systems based on lasers, and by 2000 both technologies should be supplanted by a guidance system mounted on land vehicles, boats or aircraft. Starting at a point of known position and elevation, the surveyor proceeds with the instrument from point to point along the surface to establish automatically positions and elevations needed for preparing accurate maps from images of the surface. The Defense Mapping Agency says these systems are already providing "unprecedented relative positioning accuracies." Mr. Thompson also wrote that by 2000 the "classical form of maps, in which features are represented by lines and symbols, will be supplemented or replaced to a large extent by photo-image maps or sensor-image maps." This would be facilitated by cartographic information compiled and stored in digital form at central data banks. Moreover, he predicted, the principal data-gathering machinery for much mapping would be spacecraft carrying arrays of high-resolution sensors.

Mr. Thompson says he would not significantly revise any of his predictions. "Remote sensing, satellites and computers are the future of cartography," he states, and to a remarkable extent the future has already arrived.

The new maps being produced from the new technologies may make the world more comprehensible, perhaps more manageable, but no less wondrous. It has always been thus with maps that seek to reduce the world to a scale more susceptible of human comprehension. □

THE FIFTIES

By RONALD BERMAN

The reviewer, former chairman of the National Endowment for the Humanities, teaches literature at the University of California, San Diego.

When the Going Was Good!
By Jeffrey Hart. Crown Publishers.
320 pp.

JEFFREY HART is not the first to revalue the '50s, which he sees as much more than an interlude between World War II and the Great Society. Theodore H. White's *In Search of History*—like this book a combination of essay and biography—argued that the '50s created the modern middle class. Before then the United States was stratified in an almost European way, with most of the people at the bottom of the pyramid. Afterward everyone made a lot more money; went to college in large and increasing numbers; and consumed goods and services in freight-car lots. The big events, for White, were economic and social change, the epiphenomenon was television.

Jeffrey Hart's book has something important to add: the 1950s had a culture that mattered. His first theme is that the '50s had a more lively and interesting general culture than, say, the '30s. That is not exactly an innocent statement, Hart being concerned to demonstrate that mass middle-class culture was richer, more energetic and more entertaining than the political moralizing it replaced. The second theme is that the '50s were transformational, their politics and culture carrying us through the astonishing changes of the war years in not only an orderly but a profoundly interesting way.

Like White, Hart has been helped by his own involvement with the times: he came of age intellectually in the '50s, absorbed its books, music and television, and gathered his opinions. In the following decade he was at two different strategic locations: the department of English at Columbia University and Republican campaign headquarters as a speechwriter for Ronald Reagan and Richard Nixon. He now teaches at Dartmouth College, and is a senior editor at *National Review.*

When the Going Was Good! lists a tremendous amount of what was written, played or watched during the '50s. It is a find simply as a catalogue of musicals, novels, movies and television. It reminds us of the thick texture of cultural life in that decade. It reminds us that T.S. Eliot and Ernest Hemingway and William Faulkner and Lionel Trilling and F.R. Leavis were conducting their respective sections of the orchestra. It asserts, often persuasively, that in Hollywood, New York and Washington, people were a larger size than they are now.

Hart also argues that something began to happen in the '50s: liberalism began to weaken. The Left in this period had less to say to the new majority created by the war. It was from now on to be on the defensive. This comes out not only in the political analysis of Hart's book but,

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perhaps even more usefully, in his coverage of literature and criticism. In the '50s, after all, people still listened to literary critics. Thus a good deal emerges from Hart's consideration of one of the great books of that or any other decade, Trilling's *The Liberal Imagination.* This book is in fact central to Hart's belief that liberalism declined in a decade which was attracted to newer—and sometimes to older—ideas. To begin with, Hart is intensely concerned with what he describes as the dilemma of Lionel Trilling or, really, of any "progressive" intellectual: the fact that their social ideas were confronted by adversary texts. Since many of them were teachers, they had a considerable problem in handling the evidently retrograde Yeats, Pound and Faulkner. Liberalism was all reason and optimism—qualities not present in either comedy or tragedy. But, as Hart states the matter:

> It was in literature that one could find the required sense of complexity, an expression of the full range of human possibility and human limitation, and a sense of style, intellectual energy, and refinement of thought and perception—everything, in short, that Trilling found lacking in the liberalism of 1950. But the literature he invoked was not that of the standard liberal authors. He went to James, Proust, Wordsworth, the Mark Twain of *Huckleberry Finn,* Tacitus and Freud. These were the sources of power; these were the truths and the minds that might resuscitate liberalism if anything could.

Hart does not think, however, that liberalism could have been saved, or that Trilling could maneuver himself out of his dilemma. Sandburg, Steinbeck and MacLeish could not be mentioned in the same breath with Yeats, Eliot or Faulkner. Their ideas may have been fine, but they did not make first-rate literature.

One of the most helpful things in the book is the attention Hart pays to men: there are very good critical-biographical accounts of Reinhold Niebuhr, Paul Tillich, Richard Nixon and Jack Kerouac. And then there is the attention he pays to women. Not only to Marilyn Monroe, Grace Kelly and Brigitte Bardot, but to the women of the emerging new class:

> The real basis of the racial and sexual changes that are customarily associated with the 1960s seems to have been prepared during the war years of the 1940s. World War II had a tremendous impact on the American domestic scene, introducing social and moral changes to a greater extent than any event since the Civil War. Hundreds of thousands of women went to work in the defense plants or served in the women's branches of the armed services. For the first time since the 1920s we witnessed a widespread and aggressive assertion of female sexuality, an assertion, indeed, far more widespread than anything in the '20s.

The '50s may have been stable, but they were not passive. As in the Victorian period, there were some deep undercurrents; and sexuality was symbolically present in new ways.

Some undercurrents were political. Before 1950, there were real boundaries between the races, sexes and classes. After 1960 something had clearly happened to these boundaries. Hart does not see any particular effect of the Great Society. He thinks it was the transformation of the '50s that paved the way for the various forms of new equality. He observes that Nixon's 1968 campaign headquarters was full of ambitious young Jews and Catholics whose fathers would assuredly have voted for Roosevelt. They were there because of accumulated change. He reminds us that Nixon's first campaign was run with Henry Cabot Lodge, but that his second included a man whose name had been changed from something in unpronounceable Greek to Spiro Agnew. Three hundred years were dropped in one election. In short, the '60s were a decade of some revolution but a great deal of contingency.

There are problems with this book, which is broken up into encapsulations, interchapters, biographies, reminiscences. Some of its materials were previously published as separate pieces and have not been fully woven in. Some of the judgments are either wrong or at odds with mine; I don't like *The Catcher in the Rye* or *The Old Man and the Sea* and I think that Hart overrates them (but perhaps he is thinking not of their value but of their influence). There is too much baseball, which is not that serious a subject and has been better dealt with elsewhere. But so far no one has covered the '50s better. This is a book that has information and ideas that will be new to most readers, and it is also true, at least as seen by a member of the class of '52. □

THE GREAT AMERICAN REALIST

By JOHN CANADAY

The reviewer is a former art critic for *The New York Times*.

Thomas Eakins. By Lloyd Goodrich. Harvard University Press. 693 pp.

LLOYD GOODRICH'S new book, *Thomas Eakins,* is an instant classic, a combined biography and critical history of America's greatest painter. Goodrich goes only so far as to call Eakins America's greatest realist, but there are no romantics, even among the Hudson River landscapists, who quite reach the level in their field that Eakins does in his. As for any recent 20th-century competitors, Eakins, like every respectable painter from Apelles to Picasso, took for granted that elements of abstraction are fundamental to the organization of a painting but that these values, while foundational, are only half of what has always constituted the whole of great art.

He was a painter of wide range within what would seem the limitation of an unyielding veracity to the visual world. In explicitly detailed paintings of people out of doors—fishing, rowing, sailing—he makes us breathe fresh air and feel breeze and sunlight without recourse to innovations the impressionists invented to do the same thing. Indoors, he

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ranges from the raw light and stuffy atmosphere of arenas impregnated with the athletic sweat of his boxers and wrestlers and twice-breathed air of spectators, to small, shadowed rooms where friends playing music together are transported beyond time and place. These are wonderful pictures, but it is in his portraits that Eakins triumphantly stands as an equal in the most select company of old and modern masters.

Goodrich's new book supersedes his own earlier one (*Thomas Eakins: His Life and Work*) and gives the coup de grace to any recent contenders for the title of definitive work. In his original research back in the early 1930s, he collected factual material and personal reminiscences from Eakins' widow and numbers of his colleagues, sitters and students during the last moments when these vital sources were available. He made verbatim copies of Eakins' notebooks then in the possession of the widow, but now lost.

Subsequent research by Goodrich and other scholars of American art leaves no discernible gaps in the chronological factual record of Eakins' life, and Goodrich covers the ground with accompanying examination of Eakins' art in a beautifully organized, consistently interesting and unromanticized narration. Add to this the superb production given the two volumes by the Harvard University Press for the National Gallery of Art, and you have an event that everyone connected with can be proud of. Finally, with the Eakins exhibition that opened at the Philadelphia Museum of Art and went on to the Museum of Fine Arts in Boston, 1982 looked like the year in which Eakins' stature, at last, was recognized at the highest competitive level with his European counterparts.

Because the book is a first-rate biography, *Thomas Eakins* has passages that are as valuable in their evocation of time and place as they are in the record of one person's life and work. In 1866, when he was 22, Eakins went to Paris to study at the École des Beaux-Arts under Jean-Léon Gérôme, an arch academician. The scandal of Manet's "Le Déjeuner sur l'Herbe" was still fresh after three years, shadowed only by the even more vicious furor over his "Olympia," which had erupted the year before Eakins' arrival. The innovational young painters who would later be called the impressionists (Renoir was three years older than Eakins; Monet, four) were feeling the first stings of persecution by the establishment. Yet Eakins' letters home during his three European years, with recurrent study in Paris, give no hint of awareness that a rebellion was going on. They present instead a picture of a talented, honest, ambitious, perceptive student who neither questioned the Academy's authority and the excellence of Gérôme's instruction nor knew that anyone else did. The Gérôme Eakins described in his letters, and continued to revere all his life, is far from the standard picture of the crusty, hidebound old codger who years later, facing the triumph of impressionism, still unreconciled, described as "filth" the Caillebotte collection of impressionist painting when it was offered to the Louvre.

Eakins remained curiously impervious to—seemed even to remain unaware of—modernism all his life. Before he died in 1916, American art, after a time lag, had begun to catch up with every European movement from impressionism to cubism, but Eakins remained, in Goodrich's words, "a nonacademic traditionalist" who was "never an innovator in artistic language." The close identification with his subject that makes him the perfect author for an Eakins biography is apparent in his last sentence, where Goodrich, the former director of the Whitney Museum of American Art, comes as close as he ever has to permitting himself a manifesto of his doctrine as a historian. Citing Winslow Homer and Albert Ryder along with Eakins, "The most enduring American art," Goodrich writes, "has not always been in accord with the changing currents of its time; more often it has come from the deeper springs of individual and national character."

The early struggles of the impressionists and the overplayed martyrdom of Vincent van Gogh have popularized the idea that all great 19th-century artists were involuntary saints neglected or persecuted by fiendish pygmies like Gérôme, a stereotype that writers on Eakins have seized upon. Eakins had his troubles, it is true, beginning with the rejection of his most ambitious work, the acutely realistic operating room scene called "The Gross Clinic," from the art exhibition of the Philadelphia Centennial and the humiliating compromise, after a great ruckus, of its inclusion among the Centennial's medical exhibits. The incident is inevitably paired with the rejection of the young impressionists by the official Paris salons.

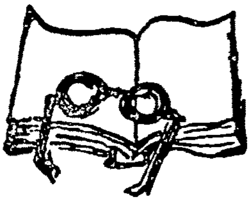
But in many ways, Eakins courted his subsequent miseries and frustrations. The impressionists were banded together in defense and companionship in a city where some deviation from the social norm was not only tolerated but expected in the tradition of artistic bohemianism. But Eakins, alone in Philadelphia, persisted in violating that city's conservative social code until he alienated even the most patient of his influential sponsors. The professional troubles besetting him culminated in his dismissal from his position as director of the Pennsylvania Academy's art school in 1886, when he was 42.

With his determinedly dispassionate approach, Goodrich recounts the known circumstances of this central disaster in Eakins' life and career insofar as they are documented, leaving open to readers whatever speculations they may want to make as to the justice or injustice of the affair.

It would be easy to construct a biography of Eakins as a repellent personality in middle and old age, drawing on verified accounts of his slovenliness, his intellectual lethargy and lack of curiosity in concerns not immediately connected with his painting and teaching. There were also his offensive suggestions to ladies sitting for commissioned portraits, his pleasure in being photographed carrying nude models around the studio, and in showing the photographs to members of the Philadelphia gentry who were most likely to be shocked. All of this Goodrich neither hides nor defends, except to express his own conviction that Eakins' late and childless marriage (at the age of 40) was not held together by his wife's patience and the sacrifice of her career to his, as is widely contended, but by deep mutual devotion.

Eakins died a few weeks before his 72nd birthday and 30 years after his dismissal from the Pennsylvania Academy. However gross some aspects of his personality had become, they were no more contradictory than the dissonance between the personality and the art of any number of great artists, including the greatest of Eakins' contemporaries, Cézanne, the plodding, fearful, awkward, socially incompetent man whose "feebleness in life," as he called it, seems irreconcilable with his genius. With the tardy recognition of Eakins now at its climax, we are probably soon due for a postmortem psychiatric analysis of the greatest American painter in an effort to explain how the subtlety, the penetration and the compassion of his finest portraits under the guise of unsparing realism, could coexist with the transformation of a vibrant young man into something like a boor.

When the psychiatrist sets to work, he should prop up facing him at one side of his typewriter Eakins' tragic self-portrait of 1902 (he was 58) or the even more heartrending profile portrait by an unknown photographer of about the same date now in the Seymour Adelman collection, and on the other side Lloyd Goodrich's book as a ready reference and watchful disciplinarian in the probing of this tormented spirit. □



POLITICS AND DEVELOPMENT

By GRACE GOODELL

The reviewer is a visiting scholar at the Harvard Institute for International Development.

Equality, the Third World and Economic Delusion. By Peter Bauer. Harvard University Press. 293 pp.
The Economics of Development and Distribution. By William Loehr and John Powelson. Harcourt Brace Jovanovich. 436 pp.

PETER BAUER, for decades a lone conservative in the field of economic development, is at last joined by two scholars who, like him, condemn centralized government and espouse the free market as the most efficacious route to economic development. These two volumes complement one another—they also challenge each other. Their parting of the ways occurs when they consider whether development is mainly an economic matter or if it requires certain political foundations.

Bauer's essays provide a critique of the ideological and psychological underpinnings of foreign aid: its recent history, the hypocrisy and opportunism of its sundry proponents and the damage (rather than benefits) which it inflicts on the Third World. With Savonarolan ardor Bauer blames Third World poverty on both the governments and the peoples there.

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His heroes are the Chinese of Hong Kong who, in their "single-minded pursuit of making money," have progressed rapidly despite the colony's exceptional population growth and its lack of natural resources, political sovereignty, notable educational achievement, government planning or special investment incentives.

If this onslaught leaves the layman dizzied, he can find no more comprehensive, balanced and humane synthesis of what we do—and do not—know about capitalistic economic development than in Loehr and Powelson's concise review. Like Bauer's, this book is likely to make economists ill at ease because of its unique range—across centuries of human history East and West, across varied social-science disciplines as well as contemporary Western economics—and its commitment to freedom, to law, to the objective test of whether development policies actually work.

Although it is written as an economics text, Loehr and Powelson's compendium introduces the reader to most major considerations in development theory and questions many of them. They demonstrate that many widely accepted policies based on government manipulation actually have no effect at all on poverty—or, worse yet, exacerbate the gap between the rich and the poor. After careful examination they find that measures for full employment rarely improve income distribution, that Third World governments themselves rather than corporations bear the blame for instituting capital-intensive technologies even when local labor is cheap, that land reform brings no benefits to the rural poor, that efforts to upgrade education often aggravate disparities in wealth by subsidizing middle-class university students while neglecting village and slum primary schools, that forgiveness of international debts would benefit the richest Third World countries instead of the poorest, since the latter are not the principal debtors anyway. Contrary to established dogma, Loehr and Powelson document the efficient and responsiveness of the private market in Third World agriculture. They highlight numerous Third World studies seldom cited elsewhere: research on bureaucratic "harassment" of small businesses for instance, and studies by the International Labor Organization itself opposing minimum-wage regulations in poor countries.

Both volumes address macroeconomic questions of development policy, the demography of the "population explosion," and "personal" attributes which, though beyond the reach of economists, largely determine economic prosperity. Both denounce many of the assumptions, criteria and research methods of development economics. In distinct ways, both studies probe the dynamics of power which underpin contemporary debates over the distribution of wealth between nations as well as between classes *within* each Third World country. As such, they seem to have laid the foundations for a conservative theory of economic development. Beyond the substantial convergence of Bauer, Loehr and Powelson, though, looms the philosophical tension of their differences. What is the central problem of "economic development," and in what direction do we seek its solution? What is the role of politics in this field, and, at the core, what is the importance of the "distribution," or "equality," which charge these titles?

For Bauer, this question is twofold: why are some people better off than others, and can "aid" redistribute the wealth between them? His response focuses on the self-defeating consequences of robbing the rich to give to the poor and on the promise of thrift and enterprise enabling the poor to become wealthy on their own. Given freedom and incentives, individuals with these traits will prosper, so a firm but restrained government like Hong Kong's should insure an environment which nurtures enterprise. Ultimately he concludes that some people are better off than others because of "personal conduct, not external forces."

For Loehr and Powelson, the central question lies not in the flux of opportunities across a spectrum of relative prosperity, but rather in an absolute: the "overwhelming" burden of poverty. Thus while Bauer emphasizes class mobility, Loehr and Powelson try to understand stark poverty both subjectively and objectively—a quest that they treat with compassion. Like Bauer they too discuss personal attributes conducive to development. But, in contrast, they look for the causes of poverty in society-wide institutions rather than in the capacities of individuals. Unusual among economists, they perceive the importance of structures which mediate between individuals and the state: institutions which foster financial trust and group leverage, for instance, or "parallel governments" which guard against overly centralized power. To them, individual enterprise can be released only when people have first acquired the classical liberal safeguards against all governments' "propensity for power." In this respect they see development as being contingent upon factors external to the individual's personal conduct.

As a result of this difference of views on social organization, these volumes disagree even more radically about the nature and role of politics in the process of development. Because the society Bauer depicts comprises only (or mainly) individuals and the state, and because he (like the others) affirms the latent potential of the former, development therefore depends on wise and well intentioned governors. He is outraged by the Third World elites' cynical manipulation of Western guilt and their countrymen's poverty for their own enrichment. "Politicization" in any instance Bauer sees as a deadening cancer caused by foreign aid, the blight on economic progress which diverts the resources and attention of both the leaders and the poor away from "productive economic activity." His volume is an exposé of political crassness, the root evil in a society whose development hinges on enlightened government.

On the other hand, for Loehr and Powelson politics and political propaganda are facts of life, with or without foreign aid. Indeed, because this is true, effective leverage against power is a prerequisite for economic development. Like Bauer, they dismiss the rhetorical demands of the North-South debate; however, what they criticize is not the crassness of these demands but their futility. They would have the Third World harness their drive for political power by learning the bargaining principles which have served the poor in the West—beginning with a more realistic appraisal of what leverage they do have (*given* their dependence) and a more accurate grasp of how selectively and gradually reforms are gained.

As for politics *within* the developing nations, far from idealizing the colonial paternalism of Hong Kong's crown government, Loehr and Powelson laud the European peoples' fierce struggle for "liberalism"—freedom from restriction—throughout their history. Through their ever persisting "politicization," the Europeans hammered out institutions which foster individual enterprise without reliance on government goodwill, institutions designed over time to protect against government (which often proves to be more a threat than an aid to enterprise). Thus the authors assert that political decentralization is a sine qua non for development. Their staunch acceptance of politics as integral to economics leads them to consider the market economy and decentralized politics separately. In the final analysis they give priority to the latter, predicting the stagnation of certain free-market societies which do not decentralize, but successful development for certain decentralized socialist societies without a market economy.

The models of society which free-market economists offer us operate with more intellectual precision when left in a political vacuum. Virtually unique among economists, Loehr and Powelson take seriously realpolitik. This is why they and Bauer, economists of the same conservative bent, end up far apart. According to Loehr and Powelson, the "commercial liberalism" which brought about Europe's brilliant development "could only have been possible with increasing balance of [political] leverage, in which coalitions bargained to obtain mutual privileges and to break down the monopolies of others." Bauer concludes just the opposite: "How misleading it is to think that the exclusion from political activity necessarily inhibits the economic prospects of a person or group."

The rift leads finally to the core of these authors' focus on development, which is economic equality. For Bauer, equality is *the* delusion of development; indeed, its promotion often creates poverty. For Loehr and Powelson "sustained material well-being...can occur only with distributions tending towards equality," because "the degree of efficiency in a society depends on the degree of balance of leverage."

How can these views be reconciled? One aspect of their difference stems from the place each volume assigns to political and economic clusterings and to political life. If *individuals* are working within a system which offers no scope for politics, then everyone does begin from the same position and has at his disposal the same means for advancement. But if institutions and groups exist which vie with one another politically, then individuals may have very *unequal* opportunities, and the system could become polarized.

A second reason for difference is that they counter the same leftist ideology from contrasting directions. Bauer rejects leveling the rich to gain equality as both unnecessary and possibly counterproductive—hence, development with equality is impossible. Loehr and Powelson seek to disprove the accusation that capitalist development always makes the poor poorer to the benefit of the rich. This must not happen, they say, because it would perpetuate poverty and extinguish political pluralism, the cornerstone of productivity—for them, equality is an imperative.

Conservatives affirm that Bauer's dynamism abounds in the Third World. But conservatives also wage war against political centralization and defend the West's broad middle class precisely because they recognize the enervating effects of too large a gap between economic and political levels in any society, however strong its institutions. In many Third World societies this gap is vast and the ladder spanning it narrow and precarious. Few of these societies have a heritage or any institutions to foster participatory politics which cut across socioeconomic rankings, the political foundation which decisively complemented capitalist development in the West and Japan. Can we rest assured that in such a context capitalism alone—entrusted to a handful of powerful families in an apolitical free market—will, over time, evolve a balance which safeguards sustained productivity and, indeed, the very fabric of society? □

AFTER THE DELUGE

By NEREO E. CONDINI

The reviewer is a freelance writer and critic.

God's Grace. By Bernard Malamud. Farrar, Straus & Giroux. 223 pp.

I THINK many of us always suspected that Bernard Malamud had a lot to give as a writer. Remember reading *The Magic Barrel* or *The Natural* and marveling at the intricate reactions that Malamud's deceptively simple prose generated? Remember privately having intimations of Malamud's greatness, even though, in public, you discussed Bellow's sharper intellect, Singer's more touching humanity? Remember the disappointment that followed when, in several later works (especially *Dubin's Lives)*, Malamud seemed to have lost his magic, his sense of humor? With the publication of *God's Grace*, the dry spell has ended. Malamud can restake his claim to deserved fame.

This richly evocative novel is the story of the re-creation of the world, as heard through the voices of God and man and animal. After a thermonuclear war destroys man—and the world as we know it—a fed-up God sends the second Flood. But paleologist Calvin Cohn somehow survives in his oceanography vessel, together with Gottlob, a trained chimpanzee who, thanks to an artificial larynx, is

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able to speak. (His language is English, albeit with a noticeable German accent.) Cohn, delighted with his sole companion, promptly renames him Buz.

The two of them sail upon the floodwaters and eventually are shipwrecked on an island that turns out to be inhabited by other chimps, baboons, a few apes and one melancholy gorilla. Cohn's passion to survive and to preserve the foundations of civilization leads him to attempt the seemingly impossible. He organizes a labor force of chimps; he instructs them in ethics and the abstract; he even fathers a humanoid girl-chimp. He begins to dream of a new, better-than-human race as his chimp community flourishes.

But can animal be measured by man? Or can man be measured by animal? Some in the community begin to have their doubts. A chimp named Esau reacts to Cohn's "gainfully employing" him by protesting to his fellow workers: "Why spoil our natures to please a non-chimp? Who is he, for instance?"

Cohn himself swings from highs to lows and worries about God, "who had let him out on a string and would snap him back on a string." But Mary Madelyn, mother of Cohn's chimp-child, remains blissfully in love, having modeled herself upon Juliet, with a skinny balding Cohn as her Romeo.

Buz is an engaging chimp, though he shares the common problem of identity. As Cohn's companion, he responds to affection but is unable to grasp complicated moral implications. In their games, for example, he is happy to win, even when the odds are stacked in his favor by Cohn. Elated by his power of human speech, Buz quickly advances in mastering the English language, though he does balk at its symbols, insisting that a word stand for what it sounds like and that the use of metaphors be eliminated.

Yet his background as an experimental chimp has affected him, for he no longer sees the world through pristine eyes. He questions Cohn constantly, inducing him to define the knowable and unknowable world. He asks about the nature of man:

> Cohn said he thought to be
> human was to be responsive to
> and protective of life and
> civilization. Buz said he would
> rather be a chimp.

As the novel nears its heartrending climax, Buz makes a single, but prophetic, final statement in human language: "I om not Buz, my name ist Gottlob." And Gottlob is German for "praise God." "Praise God" it is, for the reader is left with a sense of naked awe.

God's Grace is, in short, a parody of the human condition. But those who try to place this work within the realm of philosophy will be deluding themselves. Malamud is a writer of fiction, an artist of the word. His intention is not to elaborate a system of ethics but to create a work of art. He has, I believe, succeeded. *God's Grace* nurtures in the reader a sense of joy. □

The American Review

TRENDS OF THE FUTURE

By ANDREW HACKER

The reviewer teaches political science at Queens College in New York City. He is the author of *U.S.: A Statistical Portrait of the American People*, published in 1983.

Megatrends: Ten New Directions Transforming Our Lives. By John Naisbitt. Warner Books. 290 pp.

HERE, according to John Naisbitt, are some glimpses of business life in the decades just ahead:

- "You will tell your boss what to do. He will not tell you."
- "To be really successful, you will have to be trilingual: fluent in English, Spanish and computer."
- "The electronics, computer and information companies will replace the General Motors and U.S. Steels of today."
- "In the United States the guest workers will be robots."
- "As our school systems fail us, corporations will become the universities of the future."

These forecasts, we are warned, should not be dismissed as "futuristic guessing games." On the contrary, the seeds of the future described have already been sown. The trick is to discern in today's events the shape of tomorrow. In a book addressed largely to executives, Naisbitt tells us that he has come up with a method for doing just this. The findings in his *Megatrends: Ten New Directions Transforming Our Lives* "are based on an analysis of more than two million local articles about local events." A service headed by Naisbitt receives 6,000 newspapers every month, mostly from smaller cities, because they are where "new trends and ideas begin." Each story gets a subject matter code and is plugged into an index of "dynamic changes taking place in this country." Between 1975 and 1981, for example, the index for education fell from 109 to 45, while that for law and justice rose from 126 to 141. Naisbitt, who has been selling this information to corporate subscribers, feels that he now has enough data about basic trends to describe the kinds of lives we will be leading in the year 2000.

His first, and most pervasive, theme is that America has reached the end of its industrial era. The United States will no longer dominate in the production of physical things: automobiles and appliances, pianos and apparel. Naisbitt's point is not so much that other countries do this better—rather, it's that Americans are suited for more sophisticated activities. Their talents and resources predispose them to create an "information society," in which most people will eventually be engaged in "the creation, processing and distribution of information." Naisbitt forecasts a worldwide market for this product, sufficient to ensure prosperity at home and perhaps even primacy abroad.

The information society, it will be observed, is essentially what others have long been calling the postindustrial society. Naisbitt acknowledges a debt to Daniel Bell, the Harvard sociologist who coined that term and

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elaborated its character, but he insists in *Megatrends* that Bell's vision has been misunderstood. Most people have thought of the postindustrial society as service-oriented. This concept is too broad and general, Naisbitt believes; he wants us to focus on the fact that most "service workers" are actually working with information. Bell himself emphasized the decisive role of knowledge in the postindustrial society, so it is a bit unclear what Naisbitt is adding in renaming things—especially when his definition of "information" is so wobbly. He says that "more than 60 percent of us work with information" but never gets around to explaining what this means. Who *doesn't* work with some kind of information?

Another major theme of *Megatrends* has to do with the new informality said to be suffusing human relationships. We are moving, the author argues, from organizational hierarchies to ad hoc networks; from reliance on welfare services to "self-help" activities; from centralized government to grass-roots participation—with the latter including "the participatory corporation." There is a new breed of American who can't be pushed around; thus "the new leader is a facilitator, not an order giver." People not only want to be consulted but demand the final say. "Technical decisions, such as nuclear energy, are moving out of the hands of the so-called experts and into the political arena." Contrary to what many people intuitively assume, the technology of an information era will restore the human element in our lives rather than shrink it further. The computer makes possible an "individually tailored arrangement with each of thousands of employees." Naisbitt finds these new directions exhilarating and writes of them with exultation. "What a fantastic time to be alive!" is his closing line.

How seriously should we take all this? Not very, I would say. Indeed, Naisbitt's mode of presentation will encourage many readers to think of his book as trendy pop sociology rather than as serious scholarship. *Megatrends* is filled with aphorisms in bold and eye-arresting type: "Money is information in motion," for example. Plus punchy paragraphs with lots of figures: more than 6,000 scientific articles are published every day. During 1981-82, America's legislatures introduced 250,000 laws.

Some of Naisbitt's data may need a second check. Moreover, there are some curious omissions in his list of "megatrends." One megaproblem scarcely touched on is the aging of the population. The rising proportion of senior citizens in the population is already beginning to act as a drag on the economy, and the costs are bound to soar if retired Americans demand middle-class living standards and the best in medical care. There is also the drag represented by an underclass that shows no signs of subsiding; the grief that its members cause the rest of us, not to mention themselves, would seem of megatrend proportions. Naisbitt's references to crime in America are limited mainly to enthusiastic mentions of "self-help" operations like neighborhood patrols.

For a glance at the future we are directed to five "bellwether" states: California, Colorado, Connecticut, Florida and Washington. By his analysis, these states, rather than New York or the District of Columbia, are where "most of the social invention in America occurs." In fact, Naisbitt may be on to something interesting here: it's worth trying to identify centers of creative energy. Unfortunately, the author's examples tend toward the trivial or verge on the perverse. None of them point to high productivity in the "information society."

The world described by Naisbitt seems unreal in several ways. We are presumably entering this new world because of our increased knowledge and sophistication. Yet most so-called information tasks are relatively mundane—like recording credit-card transactions. If information is to be the major product, indeed the principal source of U.S. wealth, it would be well to ask whether other nations will remit generously for the high-grade data Americans are presumably generating. My own impression—possibly reflecting the bias of a jaded educator—is that there is much less information around than many people like to think. I have no doubt that 6,000 articles with scientific titles are churned out every day. However, for the most part their contents either elaborate the obvious or carry refinements to unnecessary extremes.

And this raises another worrisome aspect of Naisbitt's scenario. He is heralding the advent of a post-work era, where time on the job will be something akin to a period of play. As creatures of heightened sensitivities, we will expect to be counseled and consulted, to have organizational rules bent to every special case, with expanding accommodations to "rights conscious" employees. No doubt many will find all this loads of fun. But, if nothing else, it will be hugely wasteful. Whatever we produce will be carrying the overhead of all that touch and talk. At no point does Naisbitt suggest that the price of participation in an information society may be an economy with little growth.

In his formulations about the U.S. economy, Naisbitt seems infinitely less serious than another "futurist," Herman Kahn, author of *The Coming Boom.* Kahn also offers an optimistic vision, but the future he foresees seems rooted in history and responsive to economic realities. Unlike Naisbitt, Kahn keeps reminding us that prosperity comes only through investment, which implies a certain amount of saving, the postponement of gratifications, and hard work. John Naisbitt's history seems to start with the 1960s and may well have its greatest appeal for those who came of age during the decade. ☐

PERSPECTIVES ON THE NUCLEAR KNOW-NOTHINGS

By THOMAS J. BRAY

The reviewer is an associate editor of *The Wall Street Journal's* editorial page.

The Wizards of Armageddon. By Fred Kaplan. Simon & Schuster. 452 pp.
The Truth About the Neutron Bomb. By Sam Cohen. Morrow. 226 pp.
Living with Nuclear Weapons. By Harvard Study Group. Harvard University Press and Bantam Books. 268 pp.

THE anti-nuclear movement, with that lack of historical perspective and restraint that tends to typify utopian thinking, seems to think it is defining anew the paramount issue of the day. But to an outsider the most striking aspect of the arguments put forth by the anti-nuclear activists is how familiar they sound. The main issues have all been thought of and debated before.

That's clear from a reading of three recent books: *The Wizards of Armageddon* by Fred Kaplan, a young MIT graduate who writes about defense matters for a number of publications; *The Truth About the Neutron Bomb* by Sam Cohen, the man who invented the neutron bomb; and *Living with Nuclear Weapons* by a study group appointed by Harvard President Derek Bok to "educate" the public on the crucial issues of nuclear weaponry.

All three books make it plain that today's anti-nuclear activists don't have a monopoly on the difficult moral, ethical and practical questions of the nuclear age. These are questions that have absorbed many of the best minds of the West since even before Fat Man incinerated Hiroshima.

Wizards focuses on the RAND Corp., the think tank established by the Air Force after World War II. Much of the seminal work on nuclear strategy was done there. It is a fascinating inside look at the interplay between ideas and politics in the national security arena. The title betrays a certain conspiratorial approach to the subject; Kaplan obviously doesn't much like thinking the unthinkable, and at times he reflects the unfortunate tendency in popular literature to treat those who do as so many Dr. Strangeloves.

Less Than Perfect

It's also difficult for an outsider to judge the accuracy of Kaplan's account—some insiders are known to have complained that it is less than perfect. But he seems to offer a relatively clear guide through the thickets of nuclear policy as it has developed over the years. He deftly explains such arcana as game theory, systems analysis and Standard Integrated Operations Plans. He tells us about the politics of the "bomber gap" of the '50s which became the "missile

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gap" of the Kennedy campaign.

He paints vivid portraits of such wizards as Bernard Brodie, among the first to point out that deterrence is the only rational policy of the nuclear era, Herman Kahn, who, unfairly, became the model for Dr. Strangelove, and Albert Wohlstetter, the mathematical logician whose studies on vulnerability and "counterforce" set the framework for current U.S. operational doctrine. And despite his tilt, Kaplan shows that the strategic community was well aware of, indeed obsessed by, the moral and ethical dimensions of their trade.

It's widely believed, for example, that U.S. doctrine is based on the principle of Mutual Assured Destruction, or MAD, which calls for targetting cities and innocent populations as part of a strategy of deterrence by mutual terror. Wohlstetter and many of his colleagues at RAND consistently opposed this sort of approach as impractical as well as immoral, since if implemented it could reasonably be expected to trigger a MAD response from the enemy. As a result, MAD was more likely to deter ourselves than the leadership elites in the Kremlin.

MAD, fortunately, was never operational doctrine. But it was seized on by the Kennedy Administration, against its better instincts, as a rhetorical device for defining objectives in a way that would cap our own military's allegedly insatiable appetite for spending. If we had enough atomic firepower to destroy the enemy several times over, the simplism went, what possible need could there be to spend more?

At bottom, MAD was a budgetary device—not the first or last time that budgets would drive national security in unwholesome directions. MAD put a cap on the generals and admirals, all right, but it also placed a cap on efforts to exploit new technologies in ways that would lead to less genocidal means of deterrence.

Among other things, computers and microchips are making possible guidance and delivery systems that allow far greater accuracy than gravity bombs delivered by manned aircraft. Greater accuracy means less need for explosive power; the same target can be destroyed with a smaller blast. Reflecting this, the yield and number of weapons in the U.S. nuclear stockpile already has diminished greatly, a fact largely ignored by the anti-nuclear movement. A "freeze," ironically, would halt this hopeful trend.

Nuclear technology itself has not been standing still. There is a tendency to think of the atom bomb or its cousin, the even more devastating hydrogen bomb, as the ultimate weapons. Further nuclear weapons development is viewed as unnecessary if not downright pathological. Energies should be turned instead to putting the nuclear genie back in the bottle. But that sort of nuclear utopianism undermines more realistic efforts to ameliorate things, as Sam Cohen's *The Truth About the Neutron Bomb* illustrates.

Cohen, a former RAND staffer who says he worked out the neutron concept on a slide-rule in 15 or 20 minutes one day in 1958, builds a powerful case that the neutron, or "enhanced radiation," weapon, is not the anti-people, pro-property capitalist moral atrocity its critics have painted it. It not only spares property because of its greatly reduced blast and heat effects, it spares people because its radiation effects are short-lived and less widespread than those of "conventional" fission and fusion weapons. Neutrons kill, to be sure, but they don't maim or spread lethal residues away from the battlefield.

Cohen had an uphill battle getting a hearing for his concept because of the general distaste for anything radiological. President Reagan recently authorized production of neutron weapons, but not deployment—which means they most likely wouldn't be available when and where they would be needed.

The real value of the neutron weapon, Cohen argues, is in dislodging an attacking force from allied territory with far less devastation than older nuclear bombs. Instead, we continue to rely on "dirty" weapons that we're extremely unlikely to use. Once again we wind up deterring ourselves rather than others—arguably making war more rather than less likely.

Cohen describes himself as a "nuclear hawk," which won't win him any popularity contests. His tendency to see neutron weapons as some sort of magic bullet that would solve all our defense problems seems exaggerated. His sense of frustration also leads him to some extreme conclusions—for instance, his belief that the U.S. should withdraw from its world commitments into a sort of nuclear-armed Fortress America. But he need not have apologized for what he calls his "ill-tempered" writing. His sense of anger is understandable and refreshing.

Living with Nuclear Weapons by the Harvard Study Group suffers from the sort of flatness of style that typifies books-by-committee and has been roundly attacked for its generally establishment views and supposed lack of imagination. But its cautious, low-key approach serves an important purpose: A philosophically diverse group of serious scholars has demonstrated anew that there aren't any easy, overlooked alternatives to learning to live with nuclear weapons.

We can't escape into a pre-nuclear past, the group sensibly concludes. Though it is politic enough not to say it, recognition of this fact would be the beginning of wisdom in the anti-nuclear movement—and the beginning of serious debate on the options that time and technology make available. These won't render us safe from Armageddon, but they might increase the odds of survival.

However, these new options, including "conventional" weaponry now on the shelf that could replace highly destabilizing tactical nuclear weapons, won't come cheap. Indeed, one reason we have so many nuclear weapons is that they are relatively cheap. Those proclaiming a higher moral insight into the nuclear era often are the first to give short shrift to the requirements for a more "moral" defense. The anti-nuclear activists might be more closely listened to if they were honest enough to pursue the logic of their own arguments.

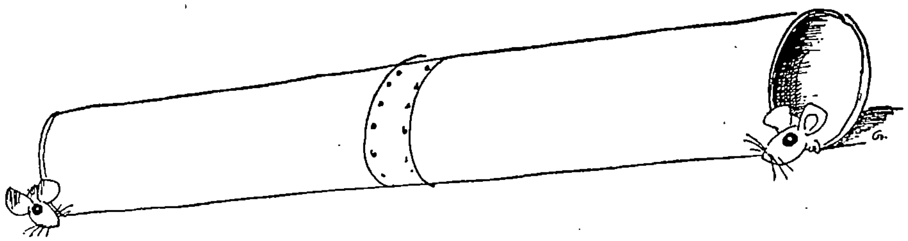
Fear May Be a Motive

Exactly why there has been a resurgence of the "peace movement" in the last year or so would make an interesting book in its own right. Casual Reagan Administration rhetoric and arms spending is often cited as the cause, but this seems unconvincing. The defense budget is still below the levels of the 1960s as a proportion of GNP; the rhetoric may sound scary but indicates no departure from past doctrine.

A more likely explanation is the dawning perception that over the last 20 years or so the Soviet Union has radically altered the balance of power through its arms buildup. Coupled with new evidence of Moscow's expansionist tendencies, the inability of even the Carter Administration to wring meaningful arms control treaties from the Kremlin and Soviet violations of existing arms treaties, this has created a deep-seated sense of unease. It is not idealism but fear that may be the chief motivating force behind the so-called peace movement.

This fear resolves itself in a sort of anti-nuclear, anti-technology know-nothingism. As with the know-nothings of the past, the anti-nuclear movement looks for familiar scapegoats. The real source of its worries—an implacable Soviet totalitarianism—is simply too terrifying to bear thinking about.

There is much to fear in the nuclear era. But the kind of hysteria we have recently encountered isn't likely to be without cost even if it abates soon, as experience suggests it will. It may make more difficult than ever the search for ways to achieve the goals that the "peace movement" professes to want: reduction of the risk of nuclear war and reduction of the devastation that such a war would undoubtedly wreak. □



WINTER 1984

THE AMERICAN REVIEW

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A NOTE TO THE READER

THE appearance in India of the Merce Cunningham Dance Company with composer John Cage opens a two-year program emphasizing educational, cultural and scientific exchanges between India and the United States. When Prime Minister Indira Gandhi visited the U.S. in 1982, she and President Reagan designated the period 1984-1985 as years of special focus to strengthen these exchanges and to put them on an enduring basis. In what has come to be known as the Festival of India and the United States, 1984 will be a year of special focus for the U.S. in India, and 1985 likewise for India in the United States.

The importance which both countries attach to this two-year celebration can be seen in the fact that Prime Minister Gandhi and Mrs. Nancy Reagan have agreed to serve as honorary co-chairpersons of the Indian and American committees which are organizing the program.

1984 is beginning auspiciously with performances by the Cunningham group with John Cage in Madras, Bombay and Delhi. The Indo-U.S. Subcommission on Education and Culture is cooperating closely with USIS and with Indian institutions, especially the Indian Council for Cultural Relations, on other programs as well.

In January alone, for example, there will be several important lectures, exhibits and performing artists beginning tours around India. Throughout the year we will see not only a series of major American cultural events, including concerts by the New York Philharmonic Orchestra conducted by Zubin Mehta, but a continuing intellectual dialogue through seminars and workshops in a variety of fields. Although these programs are important in themselves, they carry added meaning as part of the broader set of relationships between India and the United States which have acquired new dimensions in recent years.

* * * * * *

The *special section* of this issue of *American Review* discusses the work of the Merce Cunningham Dance Company and the younger generation of avant-garde dancers whom they've influenced. These articles highlight the importance of this period of cultural exchanges in the context of both the American and Indian experiences.

Of special interest, as the world collectively focuses on the need for arms control and the U.S. continues its major efforts in this direction, is *The Other Einstein,* a reflective essay discussing the philosophical legacy of the great scientist; for although Einstein's scientific research forms the basis of modern nuclear technology, his ultimate quest was to know God; he held moral, ethical and spiritual values higher than all else.

—M.P.

Merce Cunningham: The Maverick of Modern Dance

By ANNA KISSELGOFF

In the decades since Merce Cunningham left the famed Martha Graham company and formed his own modern dance troupe, his unconventional choreography has transformed the basic conception of what constitutes a dance performance. His openness to new possibilities has also made him, according to Anna Kisselgoff, "an indisputable symbolic reference point of the avant-garde in all the arts." Kisselgoff, the chief dance critic of *The New York Times,* traces Cunningham's career as dancer, choreographer and "liberating force for an entire generation."

MERCE CUNNINGHAM likes to observe insects under microscopes and animals in zoos. Exploring movement in *all* its aspects is his particular concern as a modern-dance choreographer, and he is quick to see its uses where others do not. Sitting on a bench in his New York studio the other day, he springs up and is suddenly transformed into a shortstop on an imaginary baseball diamond. Cunningham darts from side to side to field an invisible ball. "You see?" he says triumphantly, pointing out what few baseball fans ever notice: His shortstop's feet are turned out, allowing him to move with speed in either direction. Interested in speed himself, he has never agreed with modern dance's general rejection of ballet's turned-out foot position. "You need it for momentum," he says.

As a dancer, Merce Cunningham has consistently reminded straightfaced critics of a faun or a leprechaun, neither of whom, admittedly, he has ever observed.

Watching him perform with his dance company, whose New York season is scheduled to conclude in a week, one is struck ever more forcefully by the mind behind the stage persona. In the old days, Cunningham was as apt to wiggle in a plastic bag or ride a bicycle in his works as to twist through the most convoluted of movements. He will be turning 63 next month, and nowadays his fabulous leaps are present in a different form—transposed into leaps of the intellect in choreography that perpetually catch its audience off guard. The point is that as playful as he has often seemed, Cunningham has always been one of America's most serious artists.

By consensus, both those who embrace and those who reject his esthetic consider Merce Cunningham one of the few true revolutionaries in the history of dance. In discussing Cunningham as dancer, choreographer and iconoclast,

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it is all too easy, however, to become entangled in a maze of theorizing about his work. His dances, by their very nature, have posed an everlasting series of questions. Cunningham has given dance the option of becoming a nonlinear activity composed of events occurring onstage without any predictable logic. Cunningham has altered the audience's very perception of what constitutes a dance performance and explored previously inconceivable methods of putting movement together. He has extended the definition of dance movement itself and, more significantly, rejected the traditional relationship of dance to music.

But Cunningham's true impact comes from the spirit of the man himself. "What Merce did, in effect, was tell you that it was O.K. to wear black shoes with brown pants. You couldn't do that before him in dance," says Stuart Hodes, a choreographer close to the Martha Graham Company who by no means adheres to Cunningham's ideas in his own work.

It is this openness to new possibilities that has made Cunningham a liberating force not only for an entire generation of modern-dance choreographers since the 1960's but also for the dance world at large. Cunningham began choreographing in 1942 and founded his company in 1953. Today, he remains an indisputable symbolic reference point of the avant-garde in all the arts—even for those who claim, inevitably, that he is no longer avant-garde.

□

Nearly 30 years after founding his company, Cunningham is an established figure, worshiped by the young and finally recognized by that part of the mainstream audience ready to take up his invitation to drop old viewing habits. One of his works, "Duets," will be presented by Mikhail Baryshnikov, and the American Ballet Theater at the Metropolitan Opera this spring. Today and tomorrow, the Carnegie Hall Cinema will present the first public screening of "Channels/Inserts," a film that embodies Cunningham's recently developed concern with dances composed specifically for video and film.

Cunningham remains absorbed in the single-minded passion of his life—creating dances and dancing with his own company. "You're not a dancer unless you're dancing," he once told an 11-year-old pupil, who today is Patricia Birch, the Broadway and Hollywood ("Grease II") choreographer-director.

"When he said that, he gave me a whole attitude," Miss Birch recalls, describing Cunningham's influence upon her as "incredible." Miss Birch, although formerly a dancer with and still loyal to Martha Graham (against whose expressiveness Cunningham rebelled so resoundingly following his own career in the Graham company), declares, "I loved watching Merce—watching him do those strange, funny things with the long body, hunched over only at the top. He was the first to use the kind of quirks that are now prevalent. He taught me how to jump. He is an air dancer himself.

"The background he gave me was, if anything, what was so enhancing. It was the image Merce had of himself—of dignity combined with what I still think of as being Peck's bad boy—that appealed to me enormously. Merce was always a man who simply loved to dance. There are a lot of dancers who talk about it but who don't really move."

At its most basic, Cunningham's foremost concern is indeed pure movement. He is one of the prime formalists in dance, interested not only in the quality of movement but how it interacts with time and space. By no means the only one choreographing plotless works—in either ballet or modern dance—he is the strongest champion of the idea that dance is an independent art that requires no support from either music or visual effects.

In recent years, his pieces have taken an increasingly rigorous turn, becoming denser and more concentrated, even by his standards, as pure dance. They are packed with a multitude of steps, with quick changes of direction and astonishing variations in rhythm. The 14 young dancers in his company, accordingly, have become increasingly virtuosic.

"I am interested in how to put a step together," Cunningham says today. "I'm interested in how it looks from one view or another, in what it is kinesthetically—*how* you do it, what makes kinesthetic and rhythmic sense. I'm interested in exploring things such as arm placement."

In his deepest thrust into pure-movement experience, Cunningham has devised a format known as "Events," in which fragments of his works are performed end to end or simultaneously. In this new context, pieces from works that have been previously seen in toto are frequently unrecognizable and affect the viewer in a different way. There will be several "Events" during the current season and usually they are performed without décor. This might seem an apparent paradox in view of Cunningham's reputation as dance's foremost collaborator with contemporary painters, including his past or present resident designers—Robert Rauschenberg, Jasper Johns and Mark Lancaster. Yet the movement, as always, comes first. "I am and always have been fascinated by dancing," Cunningham says, "and I can just as well do a dance without the visual thing."

Cunningham would be the first to admit that life is not all that simple. Legions of viewers have not booed or walked out of Cunningham performances for three decades just because his dances have had no story or his dancers have seemed merely to move through space.

To this day, the controversial aspects of his work are his innovations of 20 years ago. The most stimulating or most irritating—depending on the point of view—is the addition of sound, occasionally at high-decibel levels, that has no obvious relationship to the dancing. The sound can range from the noise of ashtrays being scraped on mirrors in La Monte Young's score for Cunningham's "Winterbranch" (1964) to Maryanne Amacher's barely audible whirr during a performance of "Torse" (1976).

Like many choreographers who have discarded storytelling, Cunningham has insisted that the "subject" of dance is dance itself. But in asserting that dance need not depend on any musical support, he has robbed dancers and audiences of a convenient signpost. In 1952, he was the first American to choreograph a dance to magnetic tape—the electronically treated everyday sounds of *musique concrète* in "Symphonie Pour un Homme Seul" by Pierre Schaeffer and Pierre Henry. Considering that there were no traditional beats or counts here, Cunningham decided that music and dance were independent entities, that they needed to have only the same duration in common. It is standard procedure for Cunningham dancers to rehearse without music. They hear the score for the first time onstage only at a premiere.

The other aspect most apt to jolt a tradition-minded audience in an initial encounter with Cunningham's work stems from a *compositional* device—the use of chance operations to create the choreography. Chance procedures of various types, from shuffling pieces of paper to throwing dice, have been dear to a number of 20th-century poets and artists, especially the Dadaists. Cunningham saw in these methods a way of exploring movement and he was the first to apply them systematically to the choreographic process. Traditionally, a choreographer consciously decides which movements will follow which. When Cunningham turns to chance procedures, the order of the steps or sections is determined—theoretically—by a chance element beyond his control.

In his most basic procedure, he draws up a chart, whose subdivisions describe various movements he first tests with his own body. A toss of a coin or several coins determines which move to use or, for example, whether the dancers should face front or back, whether an ensemble passage should be performed by men or women. Once the choreography is completed, it remains fixed. Those who think Cunningham's dancers "dance by chance" onstage are wrong. "There is *no* improvisation in my work. Everything is set," he declares emphatically.

Since chance procedures create juxtapositions of all kinds of movement with no visible transitions, viewers expecting a linear sequence of dancing or a single focus in space are surprised by the sudden bursts of fragmentary movement phrases. Cunningham dancers move differently from other dancers. Nor do they all face the audience. Just as an "objective" chance ordering convinced Cunningham that any movement could follow any movement, he decided any point on the stage was valid for dancing. Like the Abstract Expressionist painters who exploited the entire surface of the canvas, Cunningham uses the entire stage, rejecting the traditional view that only what occurs at the center is strong enough to affect the audience. In fact, his audiences must make their own choices as to what their eyes will pick out: Cunningham dancers tend to move independently of each other, several groups often dancing at the same time.

In employing chance devices and radically dissociating dance from music, Cunningham is clearly allied with the ideas of his longtime friend and musical director, the avant-garde composer John Cage. It is easy to suggest that without Cage's influence, Cunningham would not be doing what he is doing. But there is one incontrovertible fact to consider—Cunningham is a dancer, Cage is not. If the coin tosser cannot create inventive and physically performable movement, it will never reach the stage. Cunningham himself wrote as early as 1955, "My use of chance methods...is not a position which I wish to establish and die defending. It is a present mode of freeing my imagination from its own clichés and it is a marvelous adventure in attention."

◆

Tea with Cage and Cunningham in their airy, shiny loft on the outskirts of New York's Chelsea district turns out to be a jolly, concentrated affair.

They have agreed to talk about their early years and no day could be more appropriate than a foggy afternoon which reminds them of Seattle, where they first met in 1938.

A row of shoes in the foyer invites all visitors to shed their own footwear, just as in Cunnigham's dance studio in Westbeth, the Greenwich Village artists' complex, spectators take off their shoes to keep his dancer's floor perfectly polished. It is not a Japanese custom. For all their well-known attraction to Asian thought patterns, Cunningham and Cage are not out to entertain their guests on the floor. We drink at a table.

"He drinks coffee and I don't," Cunningham says. The dancer practices yoga daily, follows a macrobiotic diet and says he likes to eat the mushrooms that Cage, a leading American mycologist, brings home.

A spectacular effect is created by hundreds of plants amassed in one room and along the window sills. "This is a mango and this is a prehistoric pine," Cage explains on the horticultural tour. He whips out a large chart that does not describe a gamut of sounds or Cunningham's movement phrases but a notation of each plant's requirements. When Cage and Cunningham are on tour, friends water the foliage according to the chart. The loft sitter is provided with a humidity gauge that Cage plunges into a pot as a demonstration.

Like many American originals, Cunningham and Cage come of solid stock. Cage grew up in California, the son of an inventor. Cunningham describes himself as being of Irish-Slavic ancestry. The Irish is on his father's mother's side, while he traces the Slavic to "my mother's grandfather, who came from Prague."

Cunningham notes that Centralia, Wash., where he was born, was not his father's hometown. "It was a lumber town of about 8,000 and called Centralia because it was directly halfway between Portland and Seattle. It was called the Hub City and as children we said, 'Oh, yes, the Hub, everything goes around it.'

"My father was from Kansas and he went to law school in Seattle. When I asked him why he chose to stay in a small town like Centralia instead of Seattle, he said that otherwise he would have been a corporation lawyer. He said that he wanted to do all kinds of law, which he did—from homesteading to murders. He was a bright man, a wonderful man and lots of fun."

Cunningham's two brothers—he is the middle son—became lawyers, and one recently retired as a judge. With a sense of distance typical of those who live in the West, Cunningham's mother would drive the boys for miles around the state. "We used to go swimming in the river or in Puget Sound, which is inland and not as cold as the Pacific. My mother adored picnics and she thought nothing of driving 100 miles for a picnic." In "Borst Park" (1972) Cunningham's dancers suddenly spread a tablecloth and seem to picnic onstage. Such unexpected moments are typical of Cunningham's more Dadaist pieces but, surprisingly, can also be very personal. "The dance was about being outdoors in a park," Cunningham says. "So I decided to call it 'Borst Park,' a park in Centralia full of wonderful trees, where you could picnic."

During this peaceable small-town American boyhood, Cunningham was bitten by the theater bug. He studied with a local dance teacher, Maude Barrett, and did the soft-shoe on the rural vaudeville circuit with Mrs. Barrett's daughter, Marjorie. After high school, he briefly followed a brother to Washington, D.C., to enroll at George Washington University, only to decide he really wanted to be an actor. In 1937, he entered Seattle's Cornish School of the Arts, founded by Nellie Cornish.

"Nellie Cornish was a great lady," he recalls. "Her idea of the arts was that you should study all of them. I had gone to be an actor, but here I was studying dance with Bonnie Bird, who had been with Martha Graham." Cunningham skipped the ballet classes, but he did study eurythmics, a Swiss system of exercises originally devised for musicians, with Doris Dennison. From Bonnie Bird he learned the dance technique which Martha Graham had only recently invented and which was eventually to become the most widespread nonballetic dance idiom in the world. Angular and percussive, the Graham dance technique had a specific esthetic goal—to communicate inner emotion through movement. But while Miss Bird, in effect, prepared Cunningham to become a Graham dancer, he had never seen Martha Graham perform.

In 1938, John Cage arrived with his wife, Xenia, at Cornish. The composer had taken a job as the accompanist for Miss Bird's dance classes, in one of which he met Cunningham. At the school, Cage discovered a closetful of percussion instruments and made more of his own. He gave percussion concerts and invented his "prepared piano," in which various objects placed on the strings turned it into a miniature percussion orchestra.

Then, as now, Cunningham seemed to thrive best when surrounded by artists in other fields. At that time, Seattle harbored a core of interesting unknowns—painters such as Mark Tobey and Morris Graves and the future writer on Buddhism Nancy Wilson Ross. The influence of Dada and Zen in Cunnigham's work could possibly be traced to this period. In the 1950's, Cage and Cunnigham attended D.T. Suzuki's lectures on Zen Buddhism at Columbia University. Cage now says his interest in Zen was sparked by a lecture Mrs. Ross gave at Cornish on Zen and Dada. "It was very important to me," Cage says. "It drew a parallel for me with its insistence on experience and the irrational rather than on logic and understanding."

Cage arranged for a show of Morris Graves's paintings, and Graves came to a Cage percussion concert. "He was very much a Dadaist, not in his work but in his life," Cage says. "Morris came with a lorgnette and a bag of peanuts." A woman on the Cornish board feared Graves "would do something outlandish, and had four men standing by to carry him out." Cage claims that Graves expressed his delight with his music by exclaiming, "Jesus in the everywhere!"—at which point he was carried out.

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In 1977, Cunningham paid tribute to these beginnings by choreographing "Inlets," in collaboration with Graves and Cage. First performed at the Cornish School, the dance is part of the current season and it is beautiful—a word which Cage and Cunningham do not eschew. As has come to be his custom, Cunningham began the choreography before he saw the set design. The dancers—who move on counts, internal rhythms and visual cues—heard the score for the first time only when they danced "Inlets" onstage. Cage had composed a score, played live by himself and two other musicians, consisting of gurgling sounds produced by rolling water in three shells of different sizes.

It was the prominence of water in the Northwest landscape that led Cunningham to his title. Whatever "Inlets" may mean to the public, the choreography is described by Cunningham in nonrepresentational terms: "I made four points on the stage for the six dancers like still points. If they came there, they could be still. But how still? So I devised various positions by chance operations—which position at what point."

Meanwhile, Graves's set design is anything but still. Its main feature is a huge silver disk that moves across the stage, seemingly a metaphor for a seasonal life cycle in a foggy clime. And yet the action is purely formal. One sees only six dancers in a gray mist behind a transparent scrim while an abstract form—a disk—is visible behind them. Chris Komar, the company's most virtuoso dancer, notes that prior to the 1977 premiere Cunningham did not tell the cast anything other than that "we should think about doing it quietly. So I jump in a quiet way. He gives you the rhythm, and inherent in the rhythm is the quality of the dance and what makes it different from another." When Bonnie Bird first saw "Inlets," Cunningham declares, "She said, 'Yes, and it has the effect of still things, such as when you might come across a totem pole.' All those things are part of my growing up."

□

While attending a summer dance session in 1939 at Mills College in Oakland, Calif., Cunningham was invited by Martha Graham to join her company in New York, where she created many leading roles for him. A couple of years later, the Cages arrived in the city and, in 1942, Cage wrote most of the music for a dance concert by Cunningham and two other Graham dancers, Jean Erdman and Nina Fonaroff. Miss Graham had just created works considered among her best, such as "Letter to the World," which involved the spoken word. Cage had another opinion.

"When I came to New York," he says, "Merce was still in the Graham company and I admired his dancing, as apparently Martha did. I didn't admire Martha's work because it was turning literary and I told Merce if he would leave Martha, I would write the music for him."

"No, you didn't," Cunningham replies. "You said we could do a program together."

"I encouraged him to do his own work, apart from Martha Graham," Cage insists.

In any event, Cunningham left the Graham company in 1945. By then, he had encountered other creative figures in New York and was particularly immersed in the city's art world, with which he has always had an affinity. In his memoir, "New York Jew," Alfred Kazin marveled at his encounters in the 1940's with the writer Paul Goodman, Cage and Cunningham, who "amazed me by their air of living for art and freedom."

In the late 1940's, Cunningham wrote hundreds of letters to colleges to obtain engagements, and presented solo concerts throughout the country with

Cage, who was now divorced. Sybil Shearer, herself a highly individualistic modern dancer, described a 1949 concert in Chicago most penetratingly: "One has to transport oneself into Cunningham's world as though you were listening to the language of animals and insects. I like his work best because it is pure."

In 1940, Martha Graham had sent Cunningham to Lincoln Kirstein's and George Balanchine's School of American Ballet. Unlike so many modern dancers, Cunningham was interested in ballet technique; in 1949, he used Tanaquil LeClercq and Betty Nichols, two Balanchine dancers, in his choreography and, in 1947, created a ballet, "The Seasons," on commission from Kirstein.

The technique Cunningham himself evolved looks balletic but differs in certain physical aspects. Unlike most other modern-dance classes, a Cunningham class begins with the dancers standing up, not sitting on the floor. Cunningham explains that he has no quarrel with ballet's technique: "One foot up will always look like an arabesque. The problem I have is with style. In the ballet, they think the only way to do a jeté is with the arms one way, which is their style. I attempt, in my technique, to use the back, the spine, the torso and the legs. In modern dance, they used the back; in ballet, the legs. Simplistically speaking, I thought, "Why not put them together in all possible ways, in all possible speeds, even in the air?"

A comparison between two solos traces the evolution of his esthetic. In "Root of an Unfocus" (1944), he says, "I still worked with expressive behavior. It was about fear. The first part was about being aware there's something outside you. The second part is when you are not sure of it, and the third part, you're not only totally unsure but going crazy and crawling offstage."

By 1953, however, Cunningham had broken with such psychological preoccupations, which he considered vestiges of his Graham days. That summer, in "Untitled Solo," he made the crucial discovery that physically incompatible movements could be juxtaposed and performed. Tossing pennies, he arrived at a sequence of opposing, isolated body movements. "This solo made me realize you could go from one movement to another that was not in your memory, your own coordination, and that probably the body could accept more than what it thought."

More than any choreographer, Cunningham became concerned with breaking up space. Just as any movement was equivalent to another, any point in space could be used by dancers, who need not face the public. The apparent discontinuity of his dances reflects his statement that "anything can follow anything"—a Zen-inspired acknowledgment of the randomness in life.

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Most of Cunningham's ideas have been adopted by two generations of experimental modern-dance choreographers, many of whom—Twyla Tharp, Lucinda Childs, Douglas Dunn–either danced or studied with him. Cunningham, however, was not prepared to sanction those of his former disciples in the experimental Judson Dance Theater of the 1960's, who used nondancers and deemphasized conventional dance training. The choreographers of the 1960's were, "in a somewhat beautiful way, touching in their use of natural movement" he says pensively, and then with a rare display of emotion, exclaims: "But it all struck me as very limited. The instant they attempted something outside that, it didn't work because they didn't have the training. I was always interested in all kinds of movement. They said no to this and no to that, and my idea was to say yes—not to be fixed but to be flexible and open."

Cunningham's newest avenue of exploration is video and film. He rejects the idea that video is merely a medium of transmission and foresees its development as an art form for dance. "Our experience with Astaire was on film and it was a dance experience, not a film experience. I am not sorry I didn't see him onstage." Cunningham, a self-styled beginner, and Charles Atlas, a film maker who is the company's production supervisor, hardly aim to produce conventional video events. Michel Guy, the former French Secretary of State for Culture who is now on Cunningham's board, says he had hoped to present a Cunningham "video fair" at Paris's Beaubourg museum recently but was stopped by insufficient funding. According to Atlas, Cunningham would have danced while carrying a small portable video camera. His images and those recorded by four other cameras would have been projected on two huge screens. The audience would have seen live dancers, live video images, pre-taped images and, as Atlas puts it, "a cameraman who was part of it."

With a current budget of $1,295,400, the Cunningham Foundation can raise only enough funds to permit a video project in alternating years—not annually, as Cunningham would like. This by no means suggests the company is still in the Volkswagen Microbus touring days of the 1950's and 60's,when it cooked out in parks and had no regular salaries. "It was fun," Cage says, and one believes him. The Cunningham company is now considered one of the best managed in dance. It has no accumulated deficit, thanks largely to a Ford Foundation cash reserve grant designed to eliminate deficits. In addition to receiving other foundation support, the company has been in particularly good favor with the National Endowment for the Arts and the New York State Council on the Arts. The Cunningham Dance Foundation's administrators, looking to the future market for video cassettes, are already distributing films and cassettes to colleges and museums.

Art Becofsky, the Cunningham Foundation's executive director, says the dancers will get $400 to $600 a week for a minimum of 12 to 16 weeks in 1982. One of the biggest expenses is transporting the 7,000 pounds of electronic equipment the troupe's experimental composers need for their knob-turning performances.

With touring costs up and American bookings down because of cuts in Federal aid to sponsors(the Federal funds that go directly to Cunningham's company have not been cut), the company might be tempted to spend more time on tour in Europe, where subsidies for the arts and the popularity of the American avant-garde are currently high. "The problem is to keep Merce from becoming an expatriate company," Becofsky says, disclosing plans for a new international fund-raising body, the International Council of the Cunningham Dance Foundation, with, "royalty" on its board.

A few weeks ago, however, the company was receiving a very unroyal welcome upon its arrival in Princeton, N.J., for two performances. There was a six-hour delay in unloading the equipment and the dancers, unable to get into their hotel rooms in the morning, napped in coffee shops. The first night's dancing did not go as smoothly as the next's. On the second day, Cunningham rehearsed the company, as he does every day. In the afternoon, the dancers found places to sleep in the theater—some on wrestling mattresses in a rehearsal hall, some in the green room.

Cunningham himself was not in the first piece, "Fielding Sixes." It is fiendishly intricate, built almost entirely on phrases in which the dancers count from one to six. As watched from the wings, the dance is perfect testimony that Cunningham's decentralization of space makes his works viewable from any angle. The choreographer himself sat in the wings, timing his dancers with a stopwatch. If they had slowed up at any given point, he could have told them where they had. Instead, he joked with the dancers after the bows and then performed in "Duets," which received tremendous applause. As usual, his dancing was marked by a quick, darting quality and an authority that set him apart from others onstage.

Cunningham knows that he is not "popular", but that is something he never set out to be. No one would ever accuse him of compromise. Most people prefer conventional music with dance and there are those who are bored with his purity and rigor. Yet a Cunningham performance is always a surprise and an adventure. It is typical of his own delight and wonder at dancing that he worries about the conceptual image of his work: "It all sounds so cerebral. But to me it's more enchantment—like an enchanted forest full of different things." □

'Pure Movement'

By DEBRA CASH

Choreographers Trisha Brown, Lucinda Childs and Laura Dean have recently been heralded as the "next wave" in modern dance. They share a pared-down dance vocabulary of elementary steps, spins and geometric patterns, often repeated over and over with only minute permutations. The result, as freelance writer Debra Cash discusses in the following article, can be "hypnotic and transcendent" for the mainstream audiences that Brown, Childs and Dean are beginning to attract.

THEY were called "the mighty matriarchs of American dance"—and for good reason. At the turn of the century, Isadora Duncan and Ruth St. Denis fundamentally reshaped the world of dance, freeing it from the traditional strictures of ballet. Their movement, and the underlying philosophy and esthetic from which it sprang, was radically new. It was called "modern dance."

Today, three other women are forging what some consider to be a similarly dramatic historical precedent. They are Trisha Brown, Lucinda Childs and Laura Dean, the leading exponents of a new dance being called "post-modern." After years working on the fringes of the dance establishment, they are today attracting large, mainstream audiences and receiving institutional recognition.

In two important series in late 1981, one at the Walker Art Center in Minneapolis and another at the Brooklyn Academy of Music, they were heralded as the "next wave," the dance world's new masters. Two of the three, Dean and Childs, have even crossed boundaries into ballet. Robert Joffrey, with his eclectic eye for new choreographic talent, commissioned a new work from Dean called *Night*. It was a controversial success, and Joffrey has invited Dean back to create another work. In 1981, Childs created *Mad Rush* for the Paris Opera Ballet.

Brown, Childs and Dean trace their roots to Merce Cunningham, taking his premises and carrying them to their ultimate conclusions. In Manhattan lofts and studios and in concerts at New York City's Judson Memorial Church —that early 1960s crucible of experimental choreography—they stripped dance down to its bare bones. They threw out trained performers. Sometimes they threw out the audience. They walked around in circles, swept the floor, darned a sock, peeled oranges, lay comatose for hours, and delivered long, self-conscious monologues. Everything could be considered dance and, frequently, everything was.

In a sense, they dismantled dance and then started gradually, with a purposefully limited vocabulary of movement, to reassemble it from scratch. Brown,

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Childs and Dean have often been described as minimalists. Their movements are spare and simple. Virtuosity is discounted, and their choreography is patterned and repetitive, often exploring geometric configurations in seemingly endless and minute permutations. The result depends on your perspective. Some find it dull. But for their growing numbers of admirers the effect is hypnotic and transcendent.

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Trisha Brown recalls that when she was a child, dance meant performing with a real, live rose pinned to her bodice. That changed when, in 1960, Brown came to New York City and latched onto the composition classes at Merce Cunningham's studio taught by Robert Dunn. Out of these classes grew the pathbreaking Judson Dance Theater, and later, Brown's work with a rowdy crew who called themselves Grand Union. At Judson, Brown's dancing was witty, deadpan and meticulous. She did a dance called *Yellowbelly* where she asked the audience to heckle her and egged them on to yell louder; she did a dance with a movie projector strapped to her back. She stationed dancers across the roofs of Soho in lower Manhattan and had them relay gestures to each other. In her "equipment dances" she strapped herself and her dancers into harnesses so that they could climb the walls of the Whitney Museum.

"In the field of avant-garde dance, in which you make up *everything*, there is not much to go on," she says. "We had to ask ourselves basic things like 'What will the structure of this dance be?' You have to establish your reasons for being out there. Otherwise, you have Narcissus at the fountain! There was no tradition to tell us what was okay to do. Some people at Judson took it at full tilt and just lived with whatever happened. I took it more slowly, starting with ordinary movement organized by game plan or task and working back to the world of decorative gestures."

Brown's dances have the look of improvisation, with the dancers sometimes resembling rag dolls tossed around by the pull of invisible magnetic fields and at other times making gestures so tiny they seem to be signaling to a world of ants. Brown's choreography fits her dancers like baggy clothing, but every wrinkle is planned by a master tailor.

Her dances are not about society or emotions. They are about the pure resources of the body, and how a clever enough mind can confound every expectation. *Son of Gone Fishin'*, premiered at the Brooklyn Academy of Music, is a palindrome of a dance. The title, Brown explains, is a gift to the audiences who will read the reviews but never see her dances—evoking, as it does, a leisurely summer's day. To a repetitive, burbling, synthesized score for organ by Robert Ashley, the dancers in turquoise, blue and green pedal pushers paddle their hands at their sides as if cooling them in a drifting stream, wriggle their shoulders lazily, and follow their legs obediently as they seem to flow upward past their heads. The dancers move without the ordinary landmarks: no gesture shows a preparation, a peak or a resolution. They amble through the crowd, and push and pull and lean and ooze, physical contact creating insignificant sparks of dramatic tension. Their bodies are dwarfed or seem to loom against sculptor Donald Judd's huge painterly blue and green backdrops, and subtly repeat the palindrome.

"If you do something very well for a very long time," says Brown, "eventually people will find out about it." At 45, she has weathered years of disapproval, years when a small loyal audience of dancers and artists were the only people she could be sure could decode her language. Has her audience changed? "Well, it's bigger," she says, with a wan smile. "I always make the mistake of speaking for my audience. But they're fickle devils, aren't they?"

□

Lucinda Childs's creed seems to be that you can never step into the same stream twice. She doesn't prove this point through formal philosophical arguments but by designing measured grids of movement, laced with interminable skipping, leaping and turning patterns. These are organized with the rigor of a stoic and performed with the concentration of a yogi.

Child's choreographic ideas are reflected in her own image as a dancer. At age 42, she looks as severe as a ballerina, her hair pulled back from a fashion model's cheekbones, her costumes usually simple and stark. Childs majored in dance at Sarah Lawrence College and there met Merce Cunningham. She also ran into a radical young choreographer named Yvonne Rainer who was a charter member of the Judson Dance Theater. After Childs graduated in 1962, Rainer invited her to join Judson.

In 1965, Childs electrified the avant-garde dance coterie with a work she called *Street Dance*. The audience was assembled in artist Robert Rauschenberg's studio, and they were instructed to look out of a particular window. Childs and another dancer abandoned them and went out into the street where they walked around and pointed to store windows and architectural details on buildings. Back in the studio, her voice on tape described what they were looking at. It was a radical message in perception.

"It was a very conceptual time," Childs says of those years. "But Judson was about ideas; what I'm doing now is more about dancing. That's why I dropped the props and the monologues and all the other supplemental devices we used to make our points. I decided to focus on just he dancing to see where that left me.

"My work comes out of the ordinary dance vocabulary," Childs explains. "Turns, leaps and pivots. I like to work with contrasts that shift very gradually so that the original thing you see you see again, but always in a slightly different way, a way removed from how you experienced it the first time."

Lucinda Childs has been compared to a watchmaker and to a mathematician. Her investigations of pure dance foil our contemporary American taste for variety and virtuosity. She doesn't try to keep the audience on the edge of its seat; rather, she aims at refocusing our attention on how simple steps can evolve over time. Often her dancers merely stride back and forth in simple patterns of walking and turning, with no particular sense of moving toward or away from any destination. Careful and circumscribed at first, the steps often take on a weight and amplification as the dance progresses, until finally the dancers are moving with a full-blown lyricism.

Dance, her most famous full-scale work, was developed after she had choreographed the now-legendary, monumental avant-garde opera *Einstein on the Beach* by Philip Glass and Robert Wilson. In *Dance*, she collaborated with Glass and experimental film-maker Sol Le Witt. While live dancers skip through and across a grid pattern on the stage floor, larger-than-life images of the same dancers are projected across the stage in a blue TV-screen light. The stage looks like what one critic described as "a horde of angels, cool but active, flying eternally on mysterious but orderly errands."

Dance poses a conceptual problem as thorny as *Street Dance* did 15 years ago. Which image is more real and immediate: the live dancer or the filmed twin? And which will leave a stronger impression after the dance is over?

In *Relative Calm*, Childs's newest piece for her own company, the dancers' simple patterns blaze and fade like Robert Wilson's backdrop of starry constellations. The dancers carefully indicate paths taken and not taken. What the audience sees is an exploding universe of movement: everything is in its place, rooted in clear, geometrical designs, but at the same time the dance's impact comes from its endless permutations.

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Laura Dean was convinced in 1968 that the world was about to end. As long as the apocalypse was coming, she decided, she was going to find her own way of dancing. In order to divest herself of her old habits she made herself sit in a studio absolutely still. Every time she stood up, her training showed through: the modern dance she had learned as a child, the ballet, the bits and pieces left over from stints in the companies of Paul Sanasardo and Paul Taylor. After two weeks, she began muttering and pacing. She found her steps had closed in on themselves and suddenly she was spinning. The physical release was so joyous that she began to laugh aloud. The clear, cool spinning of Laura Dean has become her touchstone and her signature.

Since her well-known collaboration with musician Steve Reich ended more than five years ago, Dean, now in her mid-30's, has been composing all of her own music. Two grand pianos stand by the studio door, "and it all depends on whether I hit them or hit the dance floor first." The dance and music reflect the same sensibility: each features a steady pulse and an obsessive focus. In the Prokofiev-tinged chord progressions of *Night*, the chords are pounded out and splintered while the pulse pours out steadily.

Dean's limited range of modulation and rhythmic shifts makes the music seem self-contained and self-reflective. The listener has a sense of endless impulse and virtuoso performance. Her first dances limited the dancers to spinning or stamping in squares and circles. But her pared-down vocabulary has proven to have a rich, even baroque potential.

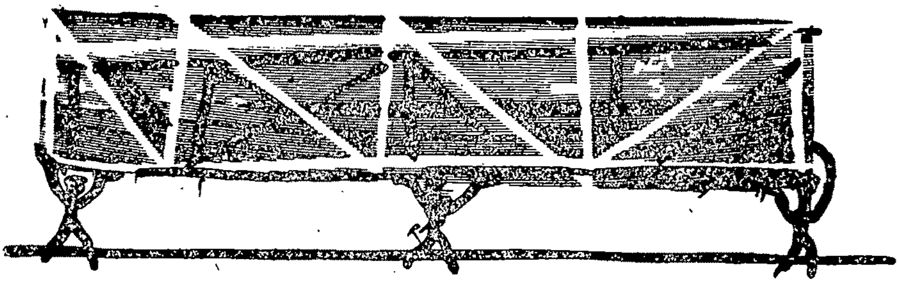
In Dean's new *Tympani*, the dancers, dressed in sleek black, grapple with the power of gravity. They begin by crouching with their backs to the audience and then sit up slowly to the beckoning sound of a kettle drum and two pianos. While the dancers lean away from a suspended leg for what seems like an eternity, the sound seems to swell. The dancers then begin to spin in little circles around a large, fixed center, like planets orbiting around an unseen mother sun.

The dance becomes ecstatic. The dancers run from the corner and sail through space in leaps that seem to traverse the entire stage. They drum their hands in the air or, dancing forehead to forehead, let their feet slip out from under them, as if they were trying to burn a hole under their feet. The pulse divides and subdivides; the visual syncopation is striking. From this climactic finale, the dancers make their ways out of the maelstrom and plant their bodies back in the world as the stage darkens.

In Dean's choreography, the dancers never stop moving and they never leave the stage. "But it's very curious," Dean says. "People think it's like marathon running, but the spinning gets you so energized that the dancers can't get to sleep afterwards.

"There's freedom in order. If you know that things are taken care of on a physical plane, then your mind can be free. I do like order, and thank God I have that kind of mind, because look at this place!" She gestures toward the neat stacks of gray card files on the shelves in her office, with the videotapes labeled and a Hirschfeld caricature of her from *The New York Times* laminated in plastic. "If I didn't like order, everything would be in constant chaos all the time, and we'd have *true* disaster on our hands."

Maybe that's what postmodern dance is all about: an attempt to discover a natural order in an apparently chaotic world. Today, the postmoderns have matured beyond their avant-garde stance of negation. Their severe minimalism appears now more as an affirmation of fundamentals. Dean's dances, like those of Brown and Childs, still engender extreme reactions. "Some people say that it makes them feel peaceful," says Dean, "and others say it makes them want to cry. Of course, some people walk out of the theater." Fewer and fewer people, however, are walking out of the theater these days—and what was recently considered only avant-garde is now gaining widespread acceptance. ☐



Cunningham Revisited

By RICHARD KOSTELANETZ

Cunningham's sphere of influence has broadened since writer Richard Kostelanetz first saw him twenty years ago. Now we find yesterday's advance guard becoming a backbone of today's modern standards. Richard Kostelanetz's latest books include a history of the nonliterary arts in the 1960s, ***Metamorphosis in the Arts*** **(Assembling), and** ***Autobiographies*** **(Mudborn, Future).** ***Wordsand,*** **an exhibition of his art with words, numbers, and lines, in several media, has been traveling since 1978.**

TWENTY years ago, it was not so easy to see Merce Cunningham, and the experience often involved incidental hazards. I remember a concert at Philharmonic Hall, August 13, 1963, in a subscription series with Donald McKayle, Paul Taylor, and Jose Limón. The audience was incredible. After every cacophonous crunch from the orchestra pit, several people in militant unison hit the aisles, creating a comic, continuous, distracting stream of exiting herds for the duration of the performance. Some *New York Times* reviewer advised that Cunningham would fare better without John Cage's music. Jill Johnston, then the dance critic of the *Village Voice,* took to her columns to reply that Cunningham without Cage would be like the Bible without God.

In those days, Cunningham rarely performed in New York, in part because of unfortunate experiences a decade before. At the end of 1953, a whole set of performances went unreviewed. Another year he was included in a putatively comprehensive series of contemporary choreographers, only to be excluded the next. My recollection is that the 1963 concert was his first New York recital in three years. In the previous seasons, aficionados had to go somewhere else—Hempstead, Philadelphia, or New London—for their annual dose. In the mid sixties, concerts of Cunningham's would happen almost by surprise, here and there around New York, perhaps once a year. The faithful audience for this work back then had a certain special quality. Consisting of many familiar faces—artists, writers, and other performers—it was the sort of peer audience that Cunningham as well as Cage had from the beginning of their mature careers. John Gruen, in *The Party's Over Now* (1972), tells the story of Harold Rosenberg screaming during the 1953 season that the show could not start because a certain painter had not yet arrived. "Everyone doubled up laughing," Gruen explained. "We all attended every event and everyone in the audience knew everyone else. 'There's a stranger in the third row,' Harold continued. 'Throw him out!' " Even a decade later, twenty years ago, I was struck by the loyalty and quality of Cunningham's backers. By the middle sixties, I recollect, painters

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such as Jasper Johns and Robert Rauschenberg were selling their works explicitly to finance Cunningham's performances in New York.

In those days, Cunningham was the key *issue* dividing the world of modern dance. What a person thought of his work would usually indicate what else he or she liked or disliked on the current scene, if not in contemporary art in general. (Antiexpressionism was more of an issue then.) Like all artistic edges, his work inspired private arguments comparable to the one between Jill Johnston and the *New York Times* reviewer. I liked what I saw, and saw Cunningham's performances as often as possible. His dances were for me a revelation about the possibilities of nonexpressionistic movement and, by extension, of nonexpressionistic mixed-means performance; about noncentered space and, analogously, uninflected time; about experiment that nonetheless respected grace and, yes, beauty; and then about nonsynchronicity: What one dancer did had no definite connection to what the others were doing, and the music had no ostensible connection to the dance. There was also an abstract truth to be learned from his refusal to suggest erotic themes or to give his women dancers movements that were generically different from those given to the men.

Even twenty years ago, when Cunningham was in his early forties (and had outgrown his early reputation as a spectacular jumper), he was the strongest male dancer I had ever seen, while his principal partner at the time, Carolyn Brown, also stood out from the rest of the company (which invariably included at least one person who was visibly weak.) The piece I liked best in those days was *Winterbranch* (1964), which I regarded as a masterpiece of terrifying theater, with its dark stage, its dancers in black sweatsuits and blackened faces, and its howling La Monte Young score. The other work I especially remember is *Variations V* (1965), which was a mixed-means piece combining Cunningham's choreography with Stan VanDerBeek's films and a forest of vertical wands attached to sound generators. The conclusion had Cunningham on a bicycle, which was the vivid epitome of his polemical assertion that *all* movements should be available to modern dance. These were pieces rich in kinetic activity and sensory stimulation, not to speak of aesthetic implications. They also drove viewers out of the hall and reviewers to splenetic outbursts.

Two decades later, so much is different. What was initially a difficult career is now a fortunate one. Cunningham has annual two-week seasons in New York. He has a foundation that regularly receives both federal and state grants. The stagecraft and busywork are no longer done by the moonlighting dancers but by a whole crew of technicians and executives. The performing company is now twice as populous as before. His new works are respectfully reviewed in the same journals that once panned or ignored him, and he recently was featured on the cover of the *New York Times Magazine* in full color.

The audiences are different as well. The same David Tudor abrasiveness that once sent spectators to the exits moved few in New York; the bright lamp shined directly into the City Center audience's faces was not taken as offensive by most. The few artists I recognized at the City Center are professionally involved with Cunningham and Cage, mostly as collaborators. Are the rest, I wondered, the same people who favor the other attractions in the City Center season: Martha Graham, Dance Theatre of Harlem, Paul Taylor, Alvin Ailey, The Joffrey Ballet, and Les Grands Ballets Canadiens? Might they be the children of those who, two decades before, would have idolized "Martha" and ignored Merce?

Cunningham's choreography has not changed as much as the times and the context. Before, as I said, I was most impressed by the scrupulous abstractness and disconnectedness. The parts of the dancers' bodies did not complement each other; the ties binding the dancers to each other were irregular; his choreography cultivated the idiosyncracies of his performers. There was little resemblance to traditional dance. The music proceeded utterly independent of the choreography. Given what I remember (and what Cunningham taught me), I now find that the dancers often move in unison, that their arms and legs often echo balletic conventions, that male/female distinctions frequently are emphasized, that the dancers resemble each other in both appearance and competence, and that gauche moments are rare. At times I could swear the music was providing a patent platform for the dance. What changed? The company perhaps; my sense of innovation in dance (and art) for sure.

What I now find missing is the earlier audacity—the audacity of *How to Pass, Kick, Fall and Run* (1965), whose "music" is John Cage reading funny stories (and at times upstaging the group); the audacity of the conclusion of *Place* (1966), where Cunningham wraps himself in a plastic bag and rolls off stage with twitches and crackles) or the audacity of the interlude in *Walkaround Time* (1968) where the dancers don warm up clothes and amble leisurly about the stage. By my count, Cunningham's last audacious move for the stage was the presentation of an Event, which is a terribly ingenious conception initially designed for unconventional performance spaces. Cunningham has always thought of his dances as having four fronts, or as being open on all sides. The proscenium theater, with only one front, was a convention to which he capitulated with particular backdrops for each piece. On tour, he often was offered gymnasiums or other comparable spaces in lieu of theaters; and since the backdrops could not be used, he was free to fill the performance and time in another way.

Events are composed of earlier dances, either in whole or part, performed in continuous sequence for over an hour. They are unique self-anthologies drawn from an ample storehouse. Though different in detail, every Event has the same theme, which is the range and characteristics of Cunningham choreography. (It seems odd that no one else has appropriated this useful structure. Perhaps their scrapbooks are not thick enough.) The first of the two Events at City Center included a sequence danced in black sweatsuits. Sure enough, it was *Winterbranch*, now in bright light (and, alas, without La Monte Young's intimidating score). Both Events included a spectacular duet between Lise Friedman and Susan Emery; its source is *Aeon* (1958).

However, those Events at City Center were fundamentally different from the one I saw five years before at the Barnard College gymnasium. Whereas the first was done to a backdrop of a huge bare wall and theatrical appliances, the second had a large white cloth (that looked like the scrim of *Inlets*). That cloth gave this Event a definite back and thus a single front that was made even more definite by the proscenium structure of the space. What we saw this year was not a true Event but a compromised one. Next time, please consider using Madison Square Garden, the 69th Regiment Armory, or the Sheep Meadow.

One friend of mine found eighty minutes too long to sit for a single dance, but that comment ignored a certain quality that this work has in common with Cage's music (and much else in avant-garde art)—it need not be seen from beginning to end, because it is a series of sequences that are essentially independent of each other (and yet complementary). Therefore, one can tune out and come back without feeling lost. (This is an interesting contemporary form that, to my recollection, scarcely anyone has written about.) My own vision is that the Events really should be longer—indeed, as long as is physically tolerable—not only because some might feel a bit shortchanged after only eighty minutes of dance, but because the dimensions of the piece should be such that spectators inclined to take a walk should feel encouraged to do so. That, indeed, is another reason for doing them in spaces more open than a proscenium theater.

What impresses me most about Cunningham now are his apparently limitless resources for unobvious invention—inventions not only in the dancers' movements but in stage compositions. Once he decided that all movements were open to dance, he proceeded down an apparently endless road. His works are a continuous multiple stream of kinetic images I had not seen before (and probably will not see again); even when he honors choreographic conventions, he disrupts them with surprising quirks. On top of that penchant for originality is an incomparable range, from the comic in his new *Gallopade* (1981) to the somber in *Inlets* (1977), from the elegant in *Trails* (1982) to the messy in *Roadrunners* (1979), from the spacious in *Fielding Sixes* (1980) to the constrained in *Tango* (1978), Cunningham's most recent solo for himself.

Indeed, it is perhaps in his choreography for himself that Cunningham is now doing his most exploratory work, for he is discovering a new vocabulary of movements for an older dancer who must nearly always keep both feet on the floor. Since *Canfield* (1969), he has given himself (and, to my recollection, only himself) solos for his hands, often fluttering with the speed of a juggler's (and yet moving nothing). He is often using props, less as extensions in the Alwin Nikolais sense than as foils and supports. In *Gallopade*, he and the company play a lot on the floor.

Five years ago, his own performance reminded me of Gordie Howe, the legendary hockey player who had come out of retirement to be on the same team as his sons. Visibily a generation older than his teammates, yet nonetheless able to do things they could not, he was both sympathetic and embarrassing in his desire to play along with the kids. Nowadays, Cunningham puts more distance between himself and the group, if only in his choreography for himself. What might be interesting now would be a Cunningham piece for a company entirely of older dancers.

The other current pioneering dimension of his art is his work with film and videotape. While he is more fortunate than early choreographers in having survived into an age of media that can transcribe economically both sight and sound, Cunningham also realizes that they offer him the opportunity to create works that ultimately exist on screens. Working in collaboration with Charles

Atlas, he has produced at least two films and one videotape that can be rented or purchased. Each is different in style from the others; each explores territory that is scarcely occupied. Of the three I saw, the most impressive, was *Locale,* in which the camera moves as the human eye cannot—in speed, to heights, from angles—in sum, making us profoundly aware of the limitations of the traditional theatrical view of dance. (Televised sports have made us similarly aware of the limitations of even the "best" stadium seat.) Indeed, the final suggestion of *Locale* is that the choreographer might eventually need to be responsible not just for the movements of his dancers but for the "movements" of his audience.

Of the eleven works I saw this past season, the strongest to my senses is *Inlets,* whose initial distinguishing mark is the white scrim that covers the proscenium from end to end and from top to bottom. For nearly the entire piece the scene is bathed in hazy light whose overall murkiness is reminiscent of *Winterbranch.* (Whereas the earlier work is black and strident, *Inlets* is fair and mellow.) The music is a John Cage composition that sounds electronic but is actually the amplified sound of water jostled in large conch shells. The crowning touch of the Morris Graves decor is a silver medallion, several feet in diameter, that inches across the back of the stage, higher than the dancers. When it reaches the center, the stage is suddently bathed in strong white light that visually obliterates the scrim until there is an equally sudden return to the initial murkiness. One quality that separates *Inlets* from other recent work and yet connects it to my earlier favorites is a fuller exploitation of the resources of performance.

Whenever Cunningham appears on stage nowadays, he gets an extra round of applause (as did Gordie Howe in his reborn years), but (as with Howe) one wonders whether these fans are honoring him in the present or appreciating his career, which as everyone knows by now, has had the classic avant-garde shape of early innovation that his colleagues dismissed, professional exclusion, sustained productivity in spite of public incomprehension and financial hardships, the development of a loyal nucleus of colleagues and then an expanding, loyal, proselytizing audience, and finally a breakthrough into popular acclaim. The difference is that Cunningham two decades ago made us think about the possibilities of dance and of the theater. There was a spiky edge to his work and to its relationship to the audience. I find that challenging quality—that risk of unacceptability—still in much of John Cage's recent work, which is at times outrageous and can drive out audiences; and I find a bit of that sort of edge in Cunningham's work with film and video.

At the root of his creative predicament is, paradoxically, his company—or, rather, the pragmatic and ultimately aesthetic burdens of supporting that talented entourage, which is the professional convention that Cunningham shares with his more conservative colleagues; and now that the company is so strong, and so much larger than before, he is even more beholden to it. Nonetheless, it is reasonable to speculate about what would happen to his art if he freed himself of that baggage. □

The Other Einstein

By TIMOTHY FERRIS

"Einstein," said Bertrand Russell, "was not only a great scientist, he was a great man." In his search for this "other Einstein," the author finds him "a dedicated humanitarian, who wrote as much about ethical and social issues as about science." Timothy Ferris is a visiting professor of journalism at the University of Southern California and author of two books, *Galaxies* and *The Red Limit*. This article first appeared in the October issue of "Science 83."

WHEN Albert Einstein died, in Princeton Hospital at 1:15 on the morning of April 18, 1955, having mumbled his last words in German to a night nurse who understood no German, he left both a scientific and a philosophical legacy. His scientific legacy has endured. The fate of Einstein's philosophical legacy, rooted in his deep commitment to human values and especially to peace, remains in doubt.

Einstein's science is flourishing. Quantum physics, which Einstein helped to invent, has spread its luminescent wings until it now embraces most of physical science. The theories of relativity, regarded as the epitome of the strange when Einstein first loosed them upon the world, have become so widely accepted that today they seem almost prosaic. The equations of special relativity are employed every day by experimenters who boost the mass of subatomic particles by accelerating them to nearly the velocity of light. General relativity, a mathematically abstruse masterpiece that had, like Bach's *Well-Tempered Clavier,* been more admired than performed while its author was alive, has become enormously popular as a tool for investigating some of the most exciting mysteries of physics, from black holes to quasars.

Einstein's life-long quest for a unified theory of physics has reawakened, too, though in a form he might hardly recognize. Theoretical physicists seeking a unified theory of particle interactions are making progress by invoking the staggering energy levels that prevailed in the first moments after the Big Bang. The key to how the universe works today may well be how it worked in the first moments of its creation, back when it was wrapped up in its space-time continuum as tightly as the petals of a flower in the bud. To understand the physics of such an epoch, researchers seek a common ground between quantum mechanics, the physics of the very small, and general relativity, the physics of the cosmos as a whole. That quest has become one of the most pressing pursuits in science. "The questions raised by Einstein," says Abraham Pais, author of an exemplary biography, *Subtle is the Lord... The Science and the Life of Albert Einstein,* "are still among those actively pursued in physics research today."

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But Einstein was more than a scientist. He was also a dedicated humanitarian, who wrote as much about ethical and social issues as about science. "Knowledge and skills alone cannot lead humanity to a happy and dignified life," he asserted. "Humanity has every reason to place the proclaimers of high moral standards and values above the discoverers of objective truth. What humanity owes to personalities like Buddha, Moses, and Jesus ranks for me higher than all the achievements of the inquiring and constructive mind." Ethical leaders like Spinoza and St. Francis of Assisi shared a "cosmic religious feeling," Einstein felt. The "most important function of art and science," he argued, is "to awaken this feeling and keep it alive."

As Bertrand Russell said, "Einstein was not only a great scientist, he was a great man." But the world has paid much closer attention to Einstein's science than to his humanitarianism. The governments of the superpowers employ tens of thousands of people who know how to transform Einstein's equations into bombs, few who have studied his counsel on why the bombs should not be built. There is little new in this. Jacob Bronowski called it "trying to buy the corpse of science," and it was an old story when Archimedes was put to work defending Syracuse with the instruments of war he invented and detested. What has changed is the destructive power of the weapons. "All our lauded technological progress—our very civilization—is like the axe in the hand of the pathological criminal," Einstein wrote. That was in 1917. The technology of destruction has since increased a millionfold, but tolerance among nations has not.

One great obstacle to understanding Einstein better is that we think we already know him. His is a peerless myth—Einstein of the rumpled sweater and snowy hair, naive and absentminded yet crammed with incomprehensible wisdom, the high school dropout who failed algebra but proved to know more than the professorial stuffed shirts, the brilliant mathematician who found time to help children with their homework.

Nor is the myth entirely false. Einstein *was,* for instance, absentminded. His wife Elsa used to bundle him up in his overcoat and leave him in the foyer, only to find him standing there a half hour later, lost in thought. Attending a reception, Einstein busied himself scribbling equations, then stood when the speeches ended and joined in the general applause, not realizing that the guests were applauding him. But he didn't fail math; he dropped out of Munich's Luitpold Gymnasium (now the Albert Einstein Gymnasium) because he hated its authoritarian atmosphere. Nor, as John Stachel, editor of the 30- to 40-volume Einstein Papers to be published by Princeton University Press beginning in 1985 remarks, was he "born old." The young Einstein looked less like Albert Schweitzer than like Bob Dylan—incendiary dark eyes under a tangle of flyaway black hair, his head cocked back in an attitude of ad hoc assurance.

But to appreciate Einstein's qualities, we must peer behind the thunderheads of the myth. There stands an Einstein of Zen-like poise who was, first and last, pacific. Peace was the subject of hundreds of his essays, letters, and lectures. His last conversation with his old friend Otto Nathan, just a few hours before his death, concerned civil liberties. The last document he signed was a proclamation against the use of nuclear arms. The advent of nuclear weapons, he maintained, had transformed international tolerance and understanding from a desirable goal into a practical necessity. He argued that the bomb had left the world with no choice but to renounce all-out war, which he called "the savage and inhuman relic of an age of barbarism."

His pacifism drew fire from the politicians. President Truman's Undersecretary of State Summer Welles dismissed as "impossible" Einstein's proposal for a world government. When Einstein's name appeared (without his permission, incidentally) on a letter advocating a break in U.S. relations with Franco's Spain, Representative John Rankin of Mississippi cried out in the House, "I call upon the Department of Justice to put a stop to this man Einstein." But Einstein kept speaking out, even when close friends warned that he was getting himself into trouble. He played no significant role in the development of the atomic bomb and indeed disregarded early suggestions that his $E=mc^2$ could be employed to make weapons. But he was quick to understand that the bombs, once built, must spell the end either to total war or to the societies that wage it.

He was a stranger not only to bellicosity but to the competitiveness and materialism that Western societies so often champion in their young. In 1932, invited to name his salary at the Institute for Advanced Study, he requested only $3,000 a year, asking, "Could I live on less?" The Institute responded by paying him $ 15,000 a year. Einstein spent little of it. On at least one occasion he offered to pay the salary of a colleague who had been refused reappointment at the institute, explaining that he had more money than he needed.

Awarded the 1921 Nobel Prize for physics, Einstein neglected to mention it in his diary, in letters to friends, or years later, on a form requesting a list of the honors he had received. This was not because he felt he didn't deserve the prize. Quite the contrary: When he divorced his first wife, Mileva, in 1919, he promised her as alimony the Nobel prize money he was confident would soon come his way. It seems instead that Einstein's attitude was one of genuine selflessness. His colleague Leopold Infeld writes that Einstein was the only scientist he worked with who cared solely for the content of scientific discoveries and not at all for whether he had made them.

Indeed, many of Einstein's worst blunders came when he distrusted his own theories. For years he discounted the prediction of general relativity, since verified by observation, that the universe expands. He also rejected, for a while, relativity's prediction of the existence of gravity waves. But the theory prevailed, and physicists today are busy designing gravity-wave telescopes to look for phenomena envisioned by Einstein's theories, if not by Einstein himself.

Einstein's fame reached oceanic dimensions, but it appears to have meant nothing to him. J.B.S. Haldane's daughter fainted when she first set eyes on Einstein. So did a judge who showed up unannounced at the door of Einstein's home in Princeton (though the judge, it must be added, was drunk). Another uninvited visitor rang the doorbell and announced to Einstein's secretary, Helen Dukas, "Madam, I have come to the United States to see the World's Fair, Professor Einstein, and the Grand Canyon." When Einstein once tried to ride a New York city subway, he was mobbed by crowds and had to get off at the first stop.

Winston Churchill, who thrived on fame, wrote that "it is better to be making the news than taking it; to be an actor rather than a critic." Einstein disagreed. "Better an understanding spectator than an electrically illuminated actor," he said. At age 70 he wrote that he thought his accomplishments had been "overvalued beyond all bounds for incomprehensible reasons. Humanity needs a few romantic idols as spots of light in the drab field of earthly existence. I have been turned into such a spot of light."

Einstein was deeply religious, though in a way sufficiently subtle to recall the dictum that if one is asked, "Do you believe in God?" the answer least likely to be understood is "Yes". Einstein's answer was that he believed in "Spinoza's God, who reveals himself in the harmony of all being." For Spinoza as for Einstein, God *is* nature. "What I see in nature," Einstein wrote, "is a magnificent structure that we can comprehend only very imperfectly, and that must fill a thinking person with a feeling of 'humility'. This is a genuinely religious feeling that has nothing to do with mysticism....

"My religiosity," he added, "consists in a humble admiration of the infinitely superior spirit that reveals itself in the little that we, with our weak and transitory understanding, can comprehend of reality."

In his scientific research, he invoked the deity so frequently that Infeld joked, "Einstein uses his concept of God more often than a Catholi cpriest." "I want to know how God created this world," Einstein said. "I want to know his thoughts, the rest are details." Einstein felt that science could never replace God—"Knowledge of what *is* does not open the door directly to what *should be*."

As a boy, Einstein composed little hymns to God and sang them on his way to school. As an adult, when his refusal to accept the ultimate validity of quantum physics had isolated him from the scientific mainstream, he insisted on continuing, as he put it , "to sing my solitary little old song." Its theme, he wrote his friend the physicist Max Born, was that the quantum principle, with its reliance upon probability rather than strict causality, "does not really bring us any closer to the secret of the 'Old One.' "

Einstein saw God as dressed in questions more than answers—"What really interests me," he told his assistant Ernst Straus, "is whether God had any choice in the creation of the world"—and his personality was imbued with a deep sense of the mysterious. "The most beautiful experience we can have is the mysterious," he said. "It is the fundamental emotion that stands at the cradle of true art and true science. Whoever does not know it is as good as dead, and his eyes are dimmed." Here may be found the wellspring of Einstein's egolessness. "The Sphinx stares at me in reproach and reminds me painfully of the Uncomprehended, blotting out the personal aspects of life," he wrote.

A solitary man, he had few if any intimate friends. "It is strange," he wrote, "to be known so universally and yet to be so lonely." Asked what might be the ideal livelihood for a working scientist, Einstein replied, "lighthouse keeper. Yet for all his detachment and steely will, he was, by all accounts, extraordinarily warm. A democrat in practice as well as theory, he dealt in the same friendly, unpretentious way with janitors and chiefs of state, students and movie stars. He once talked for hours with a crank (a trying experience in that cranks tend to be full of answers while scientists are full of questions) because the man's family told Einstein that he could be cured of his obsession in no other way. He took pains to put people at ease; colleague Banesh Hoffman recalls that when he was introduced to Einstein in the 1940s, feeling "utterly overawed and scared," Einstein suggested that Hoffman explain his work, then added, "Please go slowly. I don't understand things quickly."

"When Einstein said that," Hoffman remembers, "all my fears left me. It was *magical*—what he said and how he said it. He treated us all as equals." Einstein's friends and associates often used the word magic when describing him. Einstein used the word when describing nature. "Direct observation of facts," he said "has always had for me a kind of magical attraction."

Though he had every excuse to retreat into the privacy he craved, Einstein chose to immerse himself in the affairs of this world. "One must divide one's time between politics and equations," he said. He played the violin at Israel fundraisers, wrote recommendations for so many students and colleagues that university administrators eventually came to disregard them, answered most of the thousands of letters he received—and he really did help a few schoolchildren with their homework, assuring them that they shouldn't worry about their difficulties with math as his were even greater.

Einstein was, of course, a great intuitive artist of science, but he was also inordinately persistent. "Einstein never gave up," recalls Hoffman. In his biography, Pais remarks that "when he was on his way from special relativity to general relativity, he was almost alone in believing that you ought to generalize the notion of relativity of uniform motion to the notion of relativity of all motion. That didn't bother him. He kept thinking, kept doing, and after a period of about eight years, suddenly there was revealed to him what I would call, and I say these words with all respect, a piece of divine truth—general relativity."

Straus, Einstein's assistant from 1944 to 1948, recalls getting a glimpse of Einstein's almost manic tenacity. He and Einstein had finished writing a joint paper and were looking for a paper clip. They found one, but it was too badly bent to use, so they searched for a tool with which to straighten it. Einstein came across a box of new paper clips. Instantly he began shaping one of them into a tool with which to repair the bent paper clip. "When I asked him what he was doing," Straus recalled, "he said, 'Once I am set on a goal, it becomes difficult to deflect me.'"

Einstein had his faults. He was not, for instance, a good family man. He forgot his children's birthdays, confided to friends that he had married "disgracefully" both times, and wound up, like Mark Twain, mothered by women who brought him his slippers and denied him his cherished cigars. He was an unexceptional mathematician, though his intuition was so powerful that he could grope his way to solving unfamiliar equations.

He had no gift for popularizing his ideas. Infeld, who collaborated with him on a nontechnical book, *The Evolution of Physics*, attributed this to his separateness. "It is not easy for Einstein to emerge from his inner isolation and to realize the way in which the ordinary man speaks and thinks," Infeld remarked. Chaim Weizmann, the chemistry professor who became a world leader of the Zionist cause, joined Einstein on an Atlantic crossing and reported, upon disembarking: "During this voyage Einstein kept explaining his relativity theory to me again and again, and I now believe that he has fully understood it."

Nor was Einstein an especially gifted teacher. Indifferent toward rhetoric, he lectured in an almost inaudible voice, staring into the middle distance, in a style one student described as "thinking out loud." As Pais points out, nobody ever got a Ph.D. studying with Einstein.

He was as often blunt as tactful. Attending a lavish banquet at the University of Geneva honoring the 350th anniversary of its founding by Calvin, Einstein said to a patrician gentleman seated next to him, "Do you know what Calvin would have done if he were still here?...He would have had us all burned because of sinful gluttony."

We remember Einstein as adored, but he was also widely detested. "It is possible that Einstein was as much hated as he was loved during his lifetime," writes John Stachel. "He was hated as a Jew, a pacifist, a democrat and civil libertarian, a radical, and in later years a socialist."

For declaring that "to kill in war is not a whit better than to commit ordinary murder," and for insisting that in the nuclear age, "mankind can be saved only by a supranational system," Einstein was called impractical and naive. The best reply to this charge is his own: "Is it really a sign of unpardonable naivete," he asked, "to suggest that those in power decide among themselves that future conflicts must be settled by constitutional means rather than by the senseless sacrifice of great numbers of lives?

"The worldwide armaments race," he said, "which not only stifles scientific progress through the demands of military secrecy but serves to intensify war fears, will only be eliminated if the traditional military organization is replaced by a supranational military authority which would possess sole control of all offensive arms: a kind of world government in the interest of international security.

"Do I fear the tyranny of a world government?" he asked. "Of course I do. But I fear still more the coming of another war."

In 1945, when Einstein wrote those words, there were two or three nuclear weapons in the world. Today there are fifty thousand of them, with a total destructive force equal to four tons of TNT for every person on Earth.

A declaration against the use of nuclear arms, drafted by Bertrand Russell and signed by Einstein, put the situation this way: "There lies before us, if we choose, continual progress in happiness, knowledge, and wisdom. Shall we, instead, choose death, because we cannot forget our quarrels? We appeal as human beings to human beings: Remember your humanity and forget the rest."

On his deathbed, Einstein refused to consider surgery for the aortal aneurysm that had brought on his collapse. "It is tasteless to prolong life artificially," he said. "I have done my share, it is time to go." His body was cremated without ceremony. The ashes were scattered at an undisclosed location, so that none could make a pilgrimage to his grave.

The question of a monument has kept arising ever since. Frank Press, President Carter's science advisor, told the audience at an Einstein centennial celebration at Princeton in 1979 that "Einstein, were he with us today, would have been appalled that the world now spends more than $350 billion a year on arms and more than $30 billion on their research and development.

"If there is anything that the science community can do to honor the memory of Albert Einstein today," Press said, "it is to support efforts toward arms control."

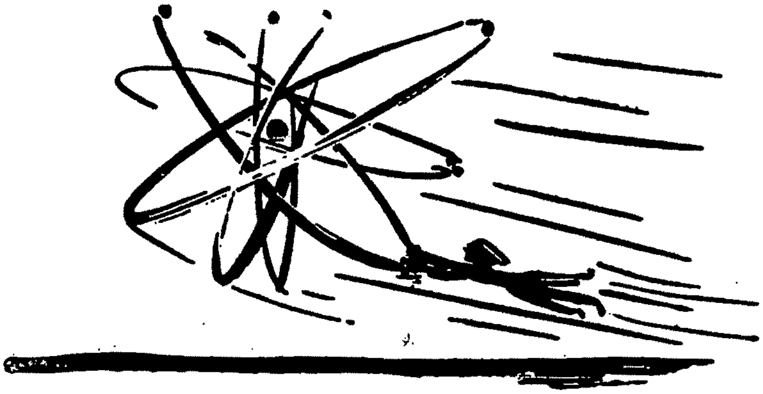
But arms spending has gone up, not down. Einstein understood that real peace might be a long time coming. In 1936 he wrote a little note on the subject, on a sheet of long-lasting rag paper to be placed in a time capsule. It read:

Dear Posterity,

If you have not become more just, more peaceful, and generally more rational than we are (or were)—why then, the Devil take you.

Having, with all respect, given utterance to this pious wish,
I am (or was),
Your,

Albert Einstein



Society, Science and Climate Change

By WILLIAM W. KELLOGG and
ROBERT SCHWARE

Since the 1960s scientists have become increasingly concerned that excess carbon dioxide in the atmosphere, produced by the burning of fossil fuels, may be creating a "greenhouse effect" that will cause a marked rise in temperatures around the world. In the following article, William W. Kellogg and Robert Schware outline current projections of climatic change in various regions and discuss the implications for agricultural production, human health and global ecology, including the possibility of substantial population migration. Kellogg is a climatologist with the National Center for Atmospheric Research (NCAR) in Boulder, Colorado. A past president of the American Meteorological Society, he has also served on numerous international committees, including the International Climate Commission. Schware is a political scientist, also based at the NCAR.

OVER the more than 4.5 thousand million years since the formation of the planet Earth, its climate has remained remarkably stable, and has apparently sustained life for about four thousand million of those years. Throughout that long period the oceans and the atmosphere have maintained an uneasy equilibrium; the sun has been a sufficiently steady source of heat so that the oceans have neither boiled their water away into space nor frozen down to the equator—fates that many other planets and satellites of the solar system have suffered.

Yet even in the recent past there have been dramatic shifts of climate. A mere 18,000 years ago most of Canada and northwestern Europe were covered by great ice sheets several kilometers thick in places (just as Greenland and the Antarctic are now). In fact, such ice ages and the kind of interglacial periods that we are in now have alternated approximately every 100,000 years for the last three million years or more.

If we turn the clock back more than 15 million years, we find an Earth with hardly any permanent ice at the poles and a much warmer climate. That was the condition that prevailed about 90 percent of the time for the past several hundred million years.

These historical facts illustrate the ever changing character of our *natural*

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climate. Up to now the factors that have determined the climate have been the sun, gradual changes in the Earth's orbit around the sun, and the complex interactions within the planetary "climate system"—the atmosphere, the oceans, the land, the ice of the polar regions and living things.

Within roughly the last 50 years a new factor has been added—the activities of man himself. A growing accumulation of evidence has persuaded most of the scientific community that human activity may be contributing to a substantial change in the Earth's climate on a global scale. In particular, large-scale consumption of fossil fuels (coal, petroleum and natural gas) is leading to an accumulation of carbon dioxide in the atmosphere, which if continued appears likely to increase the average surface temperature of the Earth by several degrees over the next 50 to 70 years. And the release into the atmosphere of other gases arising from human activity may add significantly to this overall "greenhouse effect."

There are, of course, many gaps in our understanding of how the climate system behaves, and hence many uncertainties in this prediction of the future. But few climatologists still doubt that there will be a gradual trend toward a warmer Earth in the decades ahead, assuming we continue to add enormous quantities of carbon dioxide to the atmosphere. By the same token, we can anticipate shifts in the current patterns of precipitation due to changes in atmospheric circulation, though the details of these shifts are still unclear.

Since this prospective global change is the result of human activities, we could in principle avert or at least defer it if we decided that the likely consequences were "unacceptable." Or we could take measures to mitigate the adverse effects of the change and to capitalize on its beneficial effects.

This article seeks to present a detailed picture of the possible shape of future climate change, followed by the implications of such change for the habitability of specific regions and nations in terms of three specific subjects: agricultural productivity, ecology and human health and disease—which lead to a more speculative discussion of possible climate-influenced migration. Since energy demands and practices lie at the root of the problem, it is then necessary to look especially at the interaction of these factors with progressive climate change, and the degree to which energy conservation and reliance on energy sources that do not produce carbon dioxide might mitigate or postpone the degree of climate change one would now foresee. Finally, the article suggests some of the possible elements of a "rational" approach by our political, industrial, agricultural and scientific leaders.

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It used to be generally doubted that people, so insignificant in size compared to their planet, could have any real influence on the global environment. But for at least two generations it has been clear that human activity has significantly altered the climate of our large cities and the regions downwind, and that we have aided the spread of deserts and decimated large parts of the forests that used to cover vast areas of both the temperate zones and the tropics. Such actions have altered the heat and water balance on a regional scale. And now we are influencing the climate of the Earth on a truly global scale.

Burning fossil fuels converts carbon that has been locked in the Earth for tens of millions of years to carbon dioxide and water vapor. The result has been an increase of about 20 percent in the carbon dioxide content of the atmosphere since the start of the Industrial Revolution, most of it occurring in this century. Whereas the atmospheric fraction of carbon dioxide is estimated to have been approximately 280 parts per million prior to 1900, it is now reaching 340 parts per million, or 0.034 percent by volume.

The oceans represent a sink for carbon dioxide that is some 60 times larger than the atmosphere; *eventually* almost all of the added carbon dioxide will end up in the oceans. However, the processes of removal from the atmosphere, limited by the rate of mixing of the large volume of deep ocean water with the surface mixed layer only a few hundred meters deep, are extremely slow and gradual, acting over a period of 500 years or more. Several studies have been made of the oceanic uptake and mixing processes and, while there remain a number of uncertainties, it seems likely that in the next 50 to 100 years the oceans will continue to take up a little less than half of the new carbon dioxide added each year.

One must also take account of the influence on carbon dioxide levels of the Earth's biosphere. Photosynthesis in the plants and trees of the world is a major sink for carbon dioxide; until the last century there was a rough balance between the take-up of carbon dioxide by photosynthesis and its return to the atmosphere by decay or burning. However, the forests of the world, especially those in the tropics that contain 80 to 90 percent of the living biomass, have been cut down rapidly in recent years, with further deforestation in prospect. There now rages a fierce controversy over whether this deforestation may be reducing the significance of the biosphere as a sink for carbon dioxide, and whether it may mean that the decay or burning of all that wood constitutes a net source of "new" carbon dioxide entering the atmosphere.

Just before the turn of this century a prominent American geologist and president of the University of Wisconsin, T.C. Chamberlain, and an equally prominent Swedish chemist, S. Arrhenius, independently pointed out that carbon dioxide absorbs infrared radiation from the surface of the Earth that would otherwise escape to space, and then reradiates some of this infrared energy back downward. They noted that this "greenhouse effect" should raise the temperature at the surface above what it would have been in the absence of the added carbon dioxide (though the analogy to a greenhouse is far from perfect), but no data then existed to quantify the magnitude of such an effect.

For reasons that are hard to understand, this startling hypothesis attracted relatively little attention until the 1960s, when a number of scientists began to develop quantitative theories to explain the way our climate system works. Progressively more sophisticated theoretical models of the climate system have now estimated that a doubling of carbon dioxide levels in the atmosphere should produce an average temperature rise of the Earth's surface of approximately 3°C, with an estimated uncertainty of plus or minus 1.5°C.

It must be emphasized that this estimate of a warming from increased carbon dioxide refers to the average for the globe; regional changes will undoubtedly be different. Both model results and experience with the real atmosphere indicate that the warming in the Arctic will be some three times larger than the average, and in the temperate zone of the northern hemisphere, where a large number of the developed countries lie, the change for a carbon dioxide doubling should be 4° to 6°C. In the southern hemisphere, because of its relatively larger ocean area and an Antarctic continent that will initially be much less affected than the Arctic, the warming trend would be smaller than in the northern hemisphere.

Given the increased concentration of carbon dioxide and other infrared-absorbing gases in the atmosphere that has already been observed, why have we not experienced a global warming by now? Theoretically the greenhouse effect should have caused a warming of about 0.5°C in this century, and yet there was a pronounced global cooling trend between 1940 and 1965. Inevitably this question has been raised, and the apparent contradiction has been invoked by some skeptics as a refutation of the whole concept of the greenhouse effect.

Two sets of studies have now furnished apparently conclusive answers. First, data on the retreat of Antarctic sea ice have demonstrated a clear long-term trend in that area that is consistent with the expectation of a southern hemisphere warming. And second, analyses of other natural influences on global mean surface temperature have revealed sporadic or cyclical factors whose cooling impact apparently more than offset the greenhouse effect in the years that showed the overall cooling trend. These natural influences on climate are primarily major volcanic eruptions, which are known to place enough particles in the stratosphere to attenuate solar radiation for several years at a time, and fluctuations in the total radiation from the sun.

In short, as the fluctuation due to these natural factors has been sorted out, a clear "signal" from increasing carbon dioxide is indeed revealed. While the data do not conclusively prove a warming effect from increased carbon dioxide, the temperature observations over the past 100 years are at least consistent with the notion of the greenhouse effect.

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Let us now combine these theoretical calculations of global warming with estimates of the rate of increase of carbon dioxide that may occur over the next 20 to 100 years. Levels of carbon dioxide in the atmosphere are bound to increase under almost any circumstance; the issue of pace and timing is, however, obviously of great importance. Using a "best guess" that fossil fuel use would continue to increase at roughly two percent per year, the message is fairly clear: possibly before the year 2000 and in any case before 2020—well short of a doubling of atmospheric carbon dioxide—the world may be on the average warmer than at any time in the past 1,000 years or more—that is, 1°C warmer than now. This "first stage" of climate change would stem from a rise from the present 340 parts per million to an atmospheric carbon dioxide fraction of about 360 to 370 parts per million.

While a 1°C average change does not appear at first glance to be very significant, consider first that this change will be amplified toward the poles, and at temperate and high latitudes in the northern hemisphere it may be 2° to 3°C. In the temperate zone such a temperature change would correspond to roughly a four degree difference of latitude, or the present mean temperature difference between such pairs of cities as Copenhagen and Paris or Boston and Washington. As the trend continues to a doubling of the pre-1900 level of carbon dioxide—in what might be called a "second stage" of climate change—Boston would approach the same mean temperature as Miami has at present, while the southern parts of the United States and Europe would become truly tropical. The world would be returning to the climate of a period at the dawn of recorded history, the Altithermal, some 4,500 to 8,000 years ago, when the world was definitely warmer and regional climates were very different from now.

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While it is the heat balance of the atmosphere that is directly affected by increasing carbon dioxide and its greenhouse effect, temperature is of course only one feature of weather and climate. *Rainfall* and *evaporation,* together determining *soil moisture,* are even more crucial, especially for growing food.

As to how the present worldwide distribution of soil moisture might change, theoretical climate system models are not yet adequate to tell us, although they do give some useful hints. We can gain some additional hints by looking at reconstructions of the Altithermal period when the climate was generally warmer. Then the Sahara was not a desert, but a kind of savanna able to support nomadic tribes with their cattle; North Africa and the Middle East were generally more favorable for agriculture; and the present Rajasthan Desert of northwest India was a region where several large cities prospered (cities now swallowed by sand). Still another set of useful hints comes from studies of particularly warm years or seasons during this century, for which good meteorological records of temperature and rainfall have been kept. From these records we can see how those anomalously warm times differed from the long-term average.

The implications of a scenario drawn from these three sources are fascinating. It suggests that large areas of Africa, the Middle East and India, as well as a substantial portion of central China, might cease to be water-deficient areas, or at least be much less water-deficient. On the other hand, there would probably be much drier conditions in the central section of the North American continent, and drier conditions virtually throughout the central and northern areas of the Soviet Union, so that it would be harder to grow wheat, corn, barley and other major food crops in parts of what are now the "food basket" areas of North America and the Soviet Union.

Such a climate scenario is a useful way to illustrate some of the shifts of rainfall and soil moisture that may occur as the world gradually becomes warmer, but one must be very careful when drawing conclusions from it. After all, climate change is but one of a great many changes that will be taking place in the decades ahead. Poverty, loss of arable soil and tropical forests, condition of water supplies, distribution of natural resources, population growth and so forth are all factors that must be considered when assessing impacts of climate change.

Finally, a discussion of the many aspects of a global warming would not be complete without mentioning the possibility of a future rise in sea level—

which has been prominently featured by the media. Studies have suggested that the ice sheets of Greenland and the Antarctic have been shrinking slightly in the past 100 years as the Earth grew slightly warmer, contributing to a rise of five to 10 centimeters in sea level. In the case of the West Antarctic ice sheet, there is a possibility that it could actually begin to partially disintegrate with the much greater prospective warming of the polar regions and the neighboring areas.

While a straightforward melting of these enormous masses of ice would probably take many thousands of years, it has been pointed out that most of the West Antarctic ice sheet (and portions of the larger one of the East Antarctic) rests on bedrock well below sea level. Thus, warmer ocean water could work its way under the ice sheet, causing it to relinquish its frozen hold on the bedrock, and begin sliding toward the ocean, gradually disintegrating and then melting much more rapidly through fuller exposure to the water. A rise of five to seven meters in sea level would result if the entire West Antarctic ice sheet disintegrated, since this ice sheet now rises several kilometers above sea level.

This could make the migrations of the historic past seem almost insignificant by comparison. However, it must be emphasized that glaciologists do not agree on the timescale for such an event. Whether the West Antarctic ice sheet would disintegrate in a matter of centuries or millennia following a major warming is still being debated, but in any case few, if any, experts now claim that the time involved could be less than about 200 years.

It is very likely that Arctic and Antarctic floating sea ice will become less extensive as the warming progresses, a trend that is already evident in the southern hemisphere. The Arctic Ocean is now mostly covered the entire year by floating ice, but early in the next century this ocean may become ice-free in summer. However, in contrast to the massive ice sheets that rest on land, a melting of sea ice would have no influence at all on sea level. It is nevertheless significant that, so far as can be determined from studies of Arctic Ocean bottom sediments, that ocean has never been completely free of its ice pack for some three million years—the change may thus be larger than any previous one in that entire period.

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Carbon dioxide-induced climatic change will affect many aspects of society. Let us look at what seem likely to be three crucial effects—on food production, global and regional ecology, and human health, disease and comfort, also referring briefly to the question of possible migrations of populations.

The climate changes we have suggested are bound to have a substantial influence on agriculture. Broadly speaking, it would appear that hotter and drier conditions in key growing areas of the temperate zone would have a negative effect (or at least require drastic adjustments), while in the more tropical areas that may become less arid, the effect would be favorable. But such generalizations are too simple: much would depend on the pace of change, specific offsetting effects, opportunities for agricultural migration within a given region and new technology to cushion the impact.

The primary cause of the global warming, increasing carbon dioxide, is of itself an asset to plants. Operators of greenhouses have known for years that raising the level of carbon dioxide in the air of a greenhouse will cause most plants to grow faster and larger. Furthermore they use water more efficiently, which will favor agriculture in semiarid areas. Even by the turn of this century the increase in average growing rate may exceed five percent from this cause alone.

There have been many studies of the effects of temperature during the growing season, the length of the growing season and soil moisture. Of these three factors, soil moisture is by far the most critical in the semiarid regions of the subtropics, whereas temperature and length of growing season are more often determining factors in agricultural regions at temperate latitudes. As a rough rule of thumb, a 1°C increase in mean summertime temperature corresponds to a 10-day lengthening of the growing season, which can clearly make a large difference in Canada, northern Europe and the Soviet Union.

As a longer growing season opened up new areas, might present patterns of agriculture simply migrate? One careful study estimates that the U.S. corn belt would shift 175 kilometers northeastward for each degree (centigrade) of increase in temperature, if precipitation remained unchanged. However, there are clear limits to such shifts of agricultural areas. First, rainfall and soil moisture patterns would often change as well, so that a given pattern of agriculture could no longer be practiced even by moving poleward within a region.

Second, types of soil may impose a serious restriction on the migration of agricultural practices. Thus, the scope for northward migration of grain production with warmer temperatures is limited to localities where good soils exist but the growing season is currently too short.

In the present agricultural areas of the temperate northern hemisphere, agricultural technology can provide farmers with a flexibility in the choice of crops and agricultural methods that could go a long way toward mitigating the effects of a climate change and adapting to it. Development of water resources and conservation measures can also soften the change to drier conditions, especially in view of the slowness with which the change will probably take place.

Weighing all these conflicting factors, it appears likely that the net impact of climate change would still be negative in some important producing areas of the Soviet Union, China, Canada and the United States. At the very least, three could be substantial migration and a heavy burden of adjustment measures. Conversely, the climate changes we have suggested would permit much more effective agriculture in the areas of Africa, the Middle East and parts of China that become moister. But again, one would confront the fact that present deserts or near-deserts would in some areas take a long time to become suitable for agriculture or grazing.

From a global standpoint, future drier and warmer conditions could occur in areas where roughly 50 percent of the world's wheat and 55 percent of the world's maize (corn) was grown in 1978. On the other hand, approximately 86 percent of the world's rice and 50 percent of the world's barley could be affected by wetter soil conditions, according to our climate scenario. Under generally warmer and wetter conditions, rice yields may increase in the major rice-producing countries of China, India, Indonesia, Bangladesh, Thailand and Japan. Rice production there may be encouraged by both more rainfall and longer growing seasons, the latter permitting multiple cropping in the vast areas of the temperate latitudes where only one rice crop can now be grown in the course of a summer.

Equally important to food production may be the changing climate's effects on the frequency and severity of pest outbreaks. With a global warming we can also expect changes in the frequency and geographical distribution of plant disease epidemics. It is important to expand the studies of climatic effects on plant disease in order to reduce losses when the expected global surface warming occurs.

In short, the future effects of climate change could result in major readjustments in global patterns of food production. While we cannot predict with confidence just how these readjustments will take place until we have a clearer picture of the regional shifts of soil moisture, the scenario illustrates the dimensions of the changes in store for the world—including a possible migration of the present "bread baskets" of North America and Eurasia. On balance, it appears that the world's total ability to grow food may not suffer in the long run, provided the appropriate agricultural technology is applied and planning for improved water resource management can keep ahead of the change. But the long-range challenge to agriculture must be recognized and faced now.

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Agriculture for food and fiber production differs from the less managed ecosystems of the world, such as grasslands, savannas, forests, tundra, alpine lands and deserts. A major difference is that agricultural systems usually depend on a few specialized plant species, whereas a natural ecosystem, or "biome," represents a diversity of plants and animals that interact and live in a natural balance—that is, until the balance is disturbed by humans or by climate change.

Mankind has already significantly influenced many biomes. Forests are managed for their wood products (in some places mismanaged and devastated), rangelands are grazed by cattle and thus modified, and semi-deserts are formed where overgrazing or bad agricultural practices have caused vegetation and topsoil to disappear.

There are few, if any, ecosystems remaining in the world that are free from human influence. Among the biomes still close to their natural states are the tropical forests that have not yet been exploited and the unpopulated tundra areas in the Arctic. The tropical forests will be affected chiefly by new rainfall patterns, while the Arctic tundra biome will be influenced by both precipitation and temperature.

Basically, forests require relatively high precipitation. They consume more water than other kinds of vegetation, and transfer it back to the air through their leaves by evapotranspiration. In semiarid areas, where water is precious, trees are extremely susceptible to small decreases in precipitation. Furthermore, many kinds of trees are vulnerable to insect pests, and infestations are markedly influenced by temperature and precipitation. Hence, these factors suggest that climatic change, especially changes in precipitation, will have a significant effect on the distribution of areas favorable for specific kinds of forests.

The deforestation that is taking place in some parts of the world, mostly in certain developing countries of the tropics and subtropics, is cause for concern because of its short-term environmental effect on the countries involved; even more serious in the long run must be the loss of soil and the extinction of many natural species as entire forest biomes are destroyed. The search for new generic strains of plants for agriculture relies heavily on the reservoir of natural species, or global "gene pool," and once a part of it is lost it is irreplaceable. In arresting the present dangerous trends, a higher level of carbon dioxide in the atmosphere and more rainfall in the subtropics—both of which enhance forest growth and allow it to spread into areas that are now too arid—could at least be helpful.

For the frozen tundra of the Arctic Basin, a warming induced by increased carbon dioxide would also have a very large influence. This biome is characterized by permafrost, which accounts for its low-growing vegetation, lack of trees, and poor drainage in summer. If a warming trend occurred in the tundra, the permafrost would slowly retreat, allowing trees to grow further poleward, as occurred during the Altithermal period in Canada.

Tropical forests and Arctic tundra are two cases where the impact of climate change seems fairly predictable now. In other situations the effects will become predictable only as the shape of regional climates becomes clearer. While many biomes will be displaced or modified by climate changes in the next 50 to 100 years, steadily expanding human activities and pressures will probably have an ecological impact rivaling that of climate change in this period.

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Climate relates to human health and disease in many ways, perhaps most directly in that precipitation, humidity and temperature critically affect breeding conditions, growth rates and biological diversity of many insect and bacterial species, including parasites affecting humans. This is particularly true of the serious disease agents now disproportionately concentrated in the poor and developing countries of the world, countries that tend to be in the tropics or subtropics. For example, the hookworm disease that afflicts an estimated 500 million people in tropical and subtropical regions depends on a larva whose life cycle is directly related to temperature and soil moisture.

As with agricultural pests, climate change will affect disease agents in a variety of other ways as well, and the precise effects will be distinctive for each species. About all that can be said with assurance is that the climate changes we have suggested will probably complicate substantially the task of bringing under control the major diseases that still ravage millions in the poorer countries of the world.

A more general question is how effectively human beings will perform in changed climatic conditions. This question may not be particularly serious in areas already tropical, since the changes in temperature will be less there and since the change from semiarid to water-sufficient conditions, predicted for many tropical and subtropical areas, may improve the conditions for life and activity. But in the present temperate zones, especially in the cooler areas that would experience a sharp warming trend, there is a real possibility that labor productivity will be affected, not to mention leisure activities or, at a more basic if intangible level, those behavior characteristics that distinguish "northerners" from "southerners" in almost every temperate zone country, from China to Italy to the United States. Studies lend support to the common belief that very high or very low temperature and humidity can negatively influence the capacity for physical performance, personal motivation and social behavior.

Viewed from a historical perspective, there is the celebrated thesis of Arnold Toynbee's *A Study of History* that societies tend to flourish when they are subjected to just the right degree of challenge from their environment, the interplay theory of "challenge and response." Whereas tropical and frigid climates have often stunted the growth of what he called true "civilizations," the temperate latitudes have generally been more favorable to ever new responses and challenges of the environment. If this were the case, then over a period of time we might see the most thriving societies appearing further from the equator.

A related question is whether the kind and degree of climate change suggested in this article could trigger substantial population migrations, both within countries and from one country to another. One obvious motivation for such migrations would be to get away from areas that could no longer produce food as they do now, or to move to areas where climate change was favorable for this purpose, and some of these we have examined above. But another motivation for migration could be simply a desire to seek as nearly the same climate as possible to what one now has—a subjective feeling as to one's "comfort zone."

Historically, the former factor—usually in the form of famine—has triggered many massive migrations. Egypt in the third millennium B.C., Mycenae around 1230 B.C., central Germany in the period 1360-1450, Iceland in the Middle Ages and (within the vivid family memories of many Americans) the Irish potato famine of 1845-51—all are examples of climate factors contributing to famine conditions that led to wholesale migration, loss of life, or both together. The degree and permanence of the climate changes we have suggested may be greater than in any one of these cases; on the other hand, the adaptive capacity of societies today, at least in the temperate zones, is much greater than in early historical periods.

Added together, carbon dioxide-induced climatic impacts may have major effects on human activities, but some aspects of the projected climatic changes could be beneficial. Put simply, future carbon dioxide-induced climatic impacts will cut both ways—to weal and to woe. There will inevitably be both "winners" and "losers."

Finally, a word is necessary on the implications of the possible melting of the West Antarctic ice sheet and Arctic sea. The latter, as we have seen, would have no direct influence on sea level, and, if the experts are right, anything like a full disintegration of the Antarctic ice sheet is at least 200 years off. But when and if it does come the effects would be devastating for the 30 percent of the world's population that lives wihin 50 kilometers of an ocean or sea.

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Turning now to the question of energy supply and demand in the context of future climate change, the first and rather obvious point is that it is the world's insatiable quest for ever increasing energy *supply* that is the fundamental cause of the rise in carbon dioxide. At the same time the resulting climate change, when it occurs, will influence the *demand* for various forms of energy.

On the *supply* side, the world has been depending largely on fossil fuel for its energy—in 1975 only about eight percent of global primary energy was derived from other sources: nuclear, hydropower and solar sources combined. The rate of increase of fossil fuel consumption has slackened in the past eight years to a little over two percent per year—having averaged about four percent per year from about 1900 to 1973. The actual course of the future will depend on a number of factors that are very difficult to assess, including efforts to conserve energy and use it more efficiently, willingness to invest more heavily in nuclear and renewable energy alternatives, the rate of depletion of oil and gas and ability to substitute coal, and so forth.

Energy supplies might be bolstered and fossil fuel use reduced if renewable energy resources were extensively developed; there are persuasive reasons for pushing such developments as fast as possible in any event. But some renewable sources may be more vulnerable to vagaries of climate than the present energy sources. Solar power is degraded on cloudy days, hydroelectric power suffers when there are droughts, and wind power depends on good winds. Climate variability and change should be taken into account when planning for such renewable energy resources.

Turning now to energy *demand* and the effects of a climate change on it, the outlook for the future is also difficult to asses. Energy projections generally assume that per capita energy demand will rise somewhat more in the developing countries than in the industrialized ones, and whether this will in fact take place will probably depend more on such factors as the economic squeeze on their financial capacities and the future price of fossil fuels than on factors associated with climate change.

In the developed world, however, the effect of climate change on energy demand could be substantial. Most of the industrialized countries are located in temperate latitudes, and the greatest single use of energy in these areas is for space heating and cooling. How a 2-4°C warming in average temperatures for those areas might affect heating demand is at least suggested by recent U.S. experience in the opposite direction: in the unusually cold 1976-77 winter in the eastern United States a 1.8°C drop in seasonally averaged temperatures created 22 percent more heating requirements than in preceding years.

Climate change may also affect energy demand by creating additional needs to pump water for irrigation. Again there is a recent U.S. example from the 1976-77 experience, when the rainy season in California was much drier than usual. Farmers were forced to pump up more ground water for irrigation, and the additional energy required for this operation was about one thousand million kilowatt hours in California alone.

The above examples of climatic impacts on U.S. energy demand were all due to extreme, short-lived anomalies that caused temporary hardships and unexpected costs; there are equally good examples from other countries. Although we have some experience in coping with such temporary climate variations, dealing with a more gradual, long-term change is likely to be quite different. Given enough time to prepare, agriculture and industry probably can adapt by modifying their practices. Furthermore, rising costs of energy will tend to reduce demand; people will be more willing to conserve. In other words, economic and social forces as well as climate will shape future energy demand and supply.

To summarize, a global warming will ease the requirements for space heating in temperate latitudes in winter but increase requirements for cooling, shifting the demand from the direct use of fuel to electricity. Patterns of energy use will shift but not move uniformly poleward; there will be marked regional differences in the temperature and precipitation changes due to related changes in atmospheric circulation. When our climate scenarios have been refined somewhat, the net effects on energy demand could be estimated, since the relationships between energy use and seasonal "degree days" have been reasonably well established. However, the move to conservation and use of renewable energy resources, especially solar heating, would have to be taken into account, as well as future attitudes regarding nuclear energy.

The direction that future energy policy will take in each country seems impossible to predict. The choice between the use of renewable energy resources and expansion of centralized (mostly nuclear) high-technology sources has been hotly debated for several years. In the end the choice in most countries will probably not be based on the systems analyses of the technical experts, but rather dictated by shorter-term goals and constraints and economic realities. In the debate so far, the issue of climate change from fossil fuel use has been given passing attention and lip service, but it has hardly ever been advanced as a crucial "selling point." This issue could become more central when (and if) climate change has been perceived as an inescapable reality and its potential impacts are better understood.

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Clearly, the strategies or policies that we may adopt to deal with the carbon dioxide problem depend in large part on the way we perceive it as well as on the adequacy of the national and international decision-making processes to address it. Even if the future could be predicted and precise estimates of future carbon dioxide-induced damage could be made, efforts to control fossil fuel use and carbon dioxide emissions on a worldwide basis would face extremely tough political opposition. Given the great uncertainties in our scientific predictions of future temperature and precipitation changes, any concerted worldwide agreement to limit fossil fuel use seems out of the question for some time to come. Thus, the action focus in the short and medium term should be on strategies for arriving at a clearer picture of the future, and for mitigating or delaying the adverse effects of climate changes and taking advantage of their favorable aspects. Such strategies should aim to be effective over a wide range of eventualities, since the problem areas often cannot be pinpointed as yet. Moreover, we must be realistic about which courses will be acceptable and feasible.

When, then, ought we to do? Three types of strategies seem to make clear sense:

- Strategies that lead to improved choices: examples are the organization of environmental monitoring and warning systems designed for early detection and attribution of carbon dioxide-induced climate change, provision of improved climate data and the knowledge of their application (especially to developing countries).
- Strategies that help to slow the increase of carbon dioxide: examples are energy conservation, adoption of renewable (nonfossil fuel) energy sources, increased use of nuclear energy and reforestation (which protects soil and also takes carbon dioxide out of the atmosphere, but probably not enough to counteract the current production rate).
- Strategies that increase resilience to climate change: examples of such measures are the application of agricultural technology, protection of arable soil, improvement of water management and maintenance of adequate global food reserves.

It should come as no surprise that these measures seem like "conventional wisdom"—they are good ideas, all of which have already been acted on to a greater or lesser degree. They will help us to cope with the inevitable short-term vagaries of the climate as well as a longer-term climate change, and will make our food and energy systems more reliable. Hence, these measures should be adopted in any case. The issue of carbon dioxide-induced climate change may serve as a stimulus to employ them sooner.

The time is almost bound to come—if not in the next decade, then surely by the turn of the century—when it will be both possible and necessary to take a much harder look at potential national and international measures to reduce fossil fuel consumption. The "first stage" of climate change postulated in this article is an average global temperature change of "only" 1°C, which may happen in roughly the next 20 to 30 years. Even if concerted programs were adopted immediately, this scale of change would probably still occur within at most 40 years.

But the pace of change to a "second stage" of climate change—producing an average global temperature change of 2° to 3°C (with a change of 4° to 6°C in temperate zones and even greater changes at the poles)—is something the world may see strong reason to at least postpone for as long as possible.

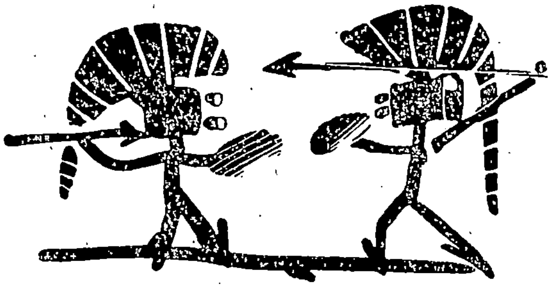
It is clear that "low growth" or "no growth" scenarios for fossil fuel consumption would substantially delay the "second stage" impact of a carbon dioxide-induced warming trend. The time available and needed for policymakers to consider implications of the climate change in a deliberate, purposeful policy design would then be extended considerably. It may even be sufficient to enable the transition in energy production to nonfossil sources to take place without massive adjustments toward nonfossil supply expansion or lower economic growth.

We must view the prospect of a carbon dioxide-induced climate change against a backdrop of other equally important environmental and societal problems facing the people of the world. In the first half of the next century, as the environmental changes will probably become increasingly more apparent, the world could well contain twice as many people, consume three times as much food and burn four times as much energy. Our future problems will be serious even without a shifting climate.

It now appears that the possible global climate change may be very disruptive to some societies, though not generally disastrous. It may trigger shifts in agricultural patterns, balances of trade and habitual ways of life for many people—and eventually, a few centuries from now, may even force abandonment of low-lying lands due to a rise of sea level. Ideally, we may hope that the countries of the world would unite to control and limit the use of fossil fuels, thereby averting or at least delaying this disruption.

The political motivation to do this is apparently lacking, however, nor is it likely to develop in the foreseeable future. There are powerful transnational as well as local interests that would surely oppose such measures, and there is no international machinery that could make such a drastic decision, much less enforce it.

The alternative, then, is to prepare for the climate change in store for us. We can hope that the necessary measures to do this are adopted at all levels of society. This article indicates a number of measures that make sense right now, even if there were no impending long-term changes. In addition, the scientific community must continue to probe the many factors involved, factors concerning the physical system that determines climate and also the factors governing the impacts of climate change on human activities. ☐



To Lift a People into Their Better Selves

By JAMES MacGREGOR BURNS

"A leader and a tyrant are polar opposites," says historian James MacGregor Burns. Distinguishing true leadership from mere power-holding domination, Burns stresses that effective democratic leaders must draw out others to participate voluntarily in a common enterprise, making better citizens of leaders and followers alike. Burns, professor of political science at Williams College, is a Pulitzer prizewinning biographer of Franklin D. Roosevelt and author of *Leadership*, from which this article is excerpted.

FOR a time the manuscript circulated quietly from hand to hand in Florence and seemed to excite no special interest. Then in 1532, five years after the author's death, it was published in Rome and the floodgates of outrage and reprobation opened. Moralists were appalled. Here was a tract that frankly put expediency over morality. It advised leaders to use craft and deceit, and worse, to use naked power and exert their will. Advice to princes had always been clothed in moralistic and theological dressing. Surely this new tract—flagrantly titled *The Prince*—must be a product of the devil. After some years it was condemned by the Church of Rome and placed on the Index. Today, more than half a millennium after the author's birth, *The Prince* still stands as the most famous—and infamous—of books of practical advice to leaders on how to win and wield power.

It seemed odd to some that such a tract should have come from the pen of Niccolo Machiavelli, for the Florentine had not seemed to benefit from his own practical wisdom. He had been one of those bright young operational types who swim rapidly to the surface during times of ferment and change. At 29 he was granted an influential post in the recently established republican government of Florence. For more than a decade he served as a high-ranking diplomat, foreign policy adviser, domestic administrator and military planner and organizer. In 1512 his newly formed militia broke ranks in the face of Spanish and German troops, the Florentine republic fell, and the Medicis returned. Machiavelli was ousted from office, arrested for treason, tortured on the rack, freed, exiled. He was then 43.

On his small ancestral farm a day's journey from Florence he supervised the work in the fields, and in the evening "I take off my peasant clothes, dirty and spotted with mud, and don royal and festive garments," he reportedly said. "Thus worthily dressed, I step among the men of antiquity and, feeling no

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weariness, forgetting all my troubles, and neither fearing poverty nor dreading death, I live wholly among them." He evidently worked first on what would become his *Discourses*, a defense of democratic republicanism, a call for leadership and a plea for military strength. Soon, however, he fell to work on *The Prince*. In 26 short chapters he laid out his mordant maxims. It is necessary for a prince who wishes to maintain himself to learn how not to be good. A prince must imitate the fox and the lion, for the lion cannot protect himself from traps and the fox cannot defend himself from wolves. One must therefore be a fox to recognize traps and a lion to frighten wolves. Those that wish to be only lions do not understand this. Therefore a prudent ruler ought not to keep faith when by so doing it would be against his interest or when the reasons which made him bind himself no longer exist. If men were all good, this precept would not be a good one; but as they are bad, and would not observe their faith with you, so you are not bound to keep faith with them. If one has to choose between inflicting severe injuries and inflicting light ones, he ought to inflict severe injuries. Princes ought to murder their opponents rather than take their property, since those who have been robbed, but not those who are dead, can plan revenge.

So shocking were these teachings that many doubted the Florentine meant them seriously. It was not clear whether he was analyzing how rulers *should* behave or how they *did* behave. What was he really trying to do? Was he a realist who described facts as he saw them, clinically? Was he a political scientist looking behind forms for general patterns of political behavior, studying evil as impersonally as a scientist analyzes epidemics? Was he a nationalist defending the methods patriots must use to unify Italy? Was he simply a man of his time, reflecting the morality of his day and his place? Or was he, on the contrary, a brilliant harbinger of realpolitik, the cornerstone of the modern state? Was he a summoner of progressive forces against the dying feudal aristocracy? Or—the most provocative speculation of all—was he a superb political satirist intending *The Prince* to be a taunt to the Medicis and a tocsin to the people of Florence, but so camouflaged as to avoid exposing the author to the rack?

None of the theories explain the strangest fact of all: Machiavelli's practical advice was not at all practical. Even amid the murderous rivalries of that time and place, princes behaving so wickedly and selfishly would win only short-run victories. Nor could interstate relations long be conducted on many of his principles. The Florentine had dramatized a profound half-truth—that men are essentially selfish, self-regarding, self-protective. But selfishness could take many forms, some of them benign. Machiavelli had projected some notions that were only locally applicable at best into an ideology of ruthlessness and selfishness.

More than mere selfishness; at the core of Machiavellianism lay the most pernicious and inhuman concept of all: the treatment of other persons, other leaders, as *things*. With Machiavelli, social psychologists Richard Christie and Florence Geis wrote, it seemed "that success in getting others to do what one wishes them to do would be enhanced by viewing them as objects to be manipulated rather than as individuals with whom one has empathy. The greater the emotional involvement with others, the greater the likelihood of identifying with their point of view." But it is precisely that—identifying with the point of view of followers—that makes the transforming leader far more effective than manipulators...

When a leader or a teacher seeks to influence a person by appealing to that person's motive base, the implicit question is: to *what* specific motives is one appealing? Who is the true "I" that is appealing, the true "me" that is being appealed to? With what resources, or power base, is one appealing? For what end and for *whose* end? In what social environment—that is, in relation to the motives and resources of what wider groups and publics and leader—follower relationships? And over what time span?

To ask these questions is to raise again the crucial but difficult problem of who is the leader, who is the led. We have long known that persons are complex bundles of motivations. *Manipulators* can appeal to such of these as meet their own wants and needs and then forget them. Yet we also know that there is typically some unity, congruence, harmony within persons' structures of motivations. For the manipulator to play on one motive, to inflate it and perhaps abuse it, is to risk disturbing effects on other motives, if only by neglecting or minimizing them. But more than this, motives tend to be organized in some kind of hierarchy. To thwart the realization of some motives will have major effects, to *satisfy* some may have even more significant effects. Again the question: who is the *who* whom someone is seeking to lead? And to what or where? Both leader and led must deal with these questions.

To appeal solely to "lower" or artificially sustained and intensified needs is to subject followers to manipulation. It has equally serious consequences for *leaders*. Essentially they manipulate themselves in manipulating others. In concentrating on a particular "lower" need of the follower they concentrate as well on their own particular motivations that prompt them to arouse that need in a follower (student, customer, voter). The more the follower's need is aroused and satisfied, the more the manipulator's motive to satisfy that need is sustained and perpetuated. Leader and led come to be locked into a symbiotic maintenance of each other's lower needs. A gun merchant may arouse in a prospective customer a fear of personal danger by conjuring up exaggerated worries about domestic enemies or foreign invaders. It is one thing to help liberate persons from a basic need, such as food or safety, so that they might be free to move up the hierarchy of needs to a level where those needs can be fulfilled; something quite different to pinion a person to an artificial need through exclusive access to that person's motive base. What is a lower and higher need, an artificial and authentic need? Only *followers* can determine that, and they can do so only if they have a fair, free and open choice, in a context of full information and conflicting or competing alternatives, and with enough time.

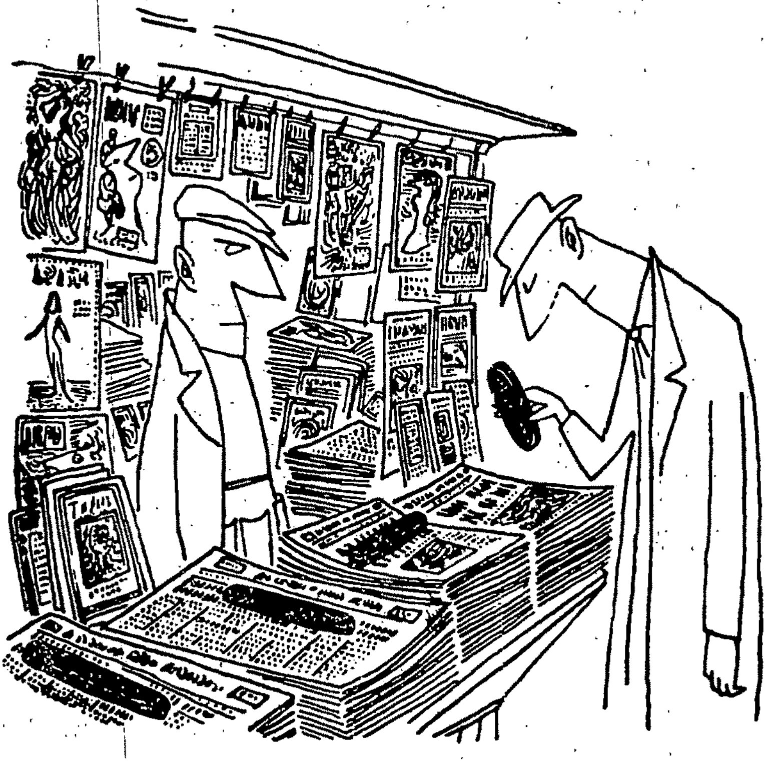
A means must be found to distinguish true leadership from manipulation at a time when such distinctions can make a difference for other leaders and for voters. That distinction must be made by *followers* at every level, from aides and advisers in circles immediately around the leaders, across a range of persons, the activists and opinion leaders and cadres in the political movement or party, to the leaders of a host of group interests, to the great number of voters and other political participants. Because followers will make these judgments, one can hope that they will evaluate rulers and politicians on the basis of potential for humane and responsible leadership. However, followers can do this—we repeat—only when leaders competing with one another have full and free opportunity to appeal to followers' "hearts and minds," that is, to various levels in their hierarchies of motives, under conditions of free speech and open conflict.

So viewed, the struggle to exert practical influence is a *competitive* struggle to reach out and activate various motivations of followers. Voters are not just manipulable puppets. The seemingly quick and easy way to appeal to those levels of manipulations—by "pandering" to the lowest and biggest and most accessible level of motivation—may also be the quick and easy way for leaders to lose contact with followers as they "really" are or as they "really" may come to be—and hence to lose power. But in variously mobilizing and satisfying and helping reshape followers' needs and other motives, the leader is entering into a full relation with followers, one that combines their motive and power bases and may cause them *both* to move to higher motivational levels. The ability to experience the emotions of a group and to voice their aspirations are both qualities vital to leadership.

This view has major implications for the representative as well as the elective process in a democracy. The conventional view is that leaders (politicians) must represent followers (voters). Yet there is no single unitary voter or follower but bundles of motive and power bases. Leaders cannot possibly "re-present" and act on those bundles in all their multi-variety. They must determine what *in* the follower they will recognize and represent, and what they will *not*. One of the oldest questions for representative democracies is whether leaders should take stands they believe in when they know their constituents do not support them. Democratic theory seems ambivalent on the matter: leaders must be representative but not too representative. John F. Kennedy wrote a book that apotheosized great Americans who were great because they did *not* follow their followers, did *not* represent the represented (or at least certain elements among the represented). While these brave leaders also tended not to fare very well at the polls, they later attracted the votes of historians; but it was Edmund Burke who said, after he had been much praised for his eloquent statement about not slavishly catering to the electors of Bristol (and had then been defeated in an election), that he thought perhaps his sentiment had been praised too much. The theory, of course, is that the voter "hires" representatives not just to reflect the voter's wants and demands but to exercise their independent judgment—after which the voters may determine how that judgment worked out (if it is not too late) and then rehire them or sack them. In thus being engaged with followers *over time*, leaders must face the test of whether they have indeed tapped authentic needs of followers.

The function of leadership is to *engage* followers, not merely to activate them, to commingle needs and aspirations and goals in a common enterprise, and in the process to make better citizens of both leaders and followers. To move from manipulation to power-wielding is to move from the arithmetic of everyday contacts and collisions to the geometry of the structure and dynamics of interaction. It is to move from checkers to chess, for in the "game of kings" we estimate the powers of our chessmen and the intentions and calculations and indeed the motives of our adversary. But democratic leadership moves far beyond chess because, as we play the game, the chessmen come alive, the bishops and knights and pawns take part on their own terms and with their own motivations, values and goals, and the game moves ahead with new momentum, direction and possibilities. In real life the most practical advice for leaders is not to treat pawns like pawns, nor princes like princes, but all persons like *persons*.

Woodrow Wilson called for leaders who, by boldly interpreting the nation's conscience, could lift a people out of their everyday selves. That people can be lifted *into* their better selves is the secret of transforming leadership. □



Leaders Center Their Assumptions on People Rather Than on Structures

By ABRAHAM ZALEZNIK

In this article Abraham Zaleznik discusses some of the major differences between managerial and leadership styles, and suggests that in recent years institutions have stressed the structure and processes of management rather than people. Thus the "sense of self" that produces great leaders has tended to be stifled. Zaleznik is professor of social psychology of management at the Harvard University Graduate School of Business and the author of ***Power and the Corporate Mind*** **and** ***Human Dilemmas of Leadership*****.**

FIVE years ago, in the *Harvard Business Review*, I raised the question of whether managers and leaders have distinctly different types of personality. I said that American business had created a new breed called the manager, whose function is to ensure the "competence, control and the balance-of-power relations among groups with the potential for rivalry." The managerial ethic has fostered a bureaucratic culture that minimizes imaginative capacity and the ability to visualize purposes and to generate values at work, all important attributes of leaders who interact with followers.

The manager was seen as a person with practical responsibilities, who sees that problems are resolved in such a way that people at different levels of responsibility will continue to contribute effectively to the organization. Managerial practice focuses on the decision-making process rather than ultimate events, and managers themselves are typically hardworking, intelligent, analytical and tolerant of others. Individuals who are usually thought of as leaders, on the other hand—more dramatic in style and unpredictable in behavior—seem to dominate the swirl of power and politics with an authority that stems from personal magnetism and commitment to their own undertakings and destinies.

During periods of stress and change, society feels an inherent tension between its need for both managers and leaders, for both stability and innovation, and shows symptoms of the deficiency it may have created by stimulating an adequate supply of one type at the expense of the other.

Managerial goals are deeply embedded in the structure of the organization,

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in contrast to entrepreneurial or individual leadership goals, which actively attempt to shape public ideas and tastes. Instead of boldly adopting technical innovation or taking risks with untested ideas, managers tend to survey constituents' needs and build their goals on a rational anticipation of the response. They tend to avoid direct confrontation or solutions that could stir up strong feelings of support or opposition. To reconcile differences among people they often seek ways to convert win-lose situations into win-win situations. They focus subordinates' attention on procedures rather than on the substance of decisions, communicate in signals rather than in clearly stated messages, and play for time to take the sting out of win-lose. These tactics frequently create a climate of bureaucratic intrigue and control, which may account for subordinates' often viewing managers as inscrutable, detached and manipulative.

A leader is more interested in what events and decisions mean to people than in his own role in getting things accomplished. The atmosphere leaders create is often one of ferment, which intensifies individual motivation and often results in unanticipated outcomes. Risk is involved in the uncertainty of whether this intensity produces innovation and high performance, or is just wasted energy.

A sense of belonging, of being part of a group or organization, is important to managers. Perpetuating and strengthening existing institutions enhances their sense of self-worth: they are performing in a role that harmonizes with the ideals of duty and responsibility. Leaders tend to feel somewhat apart from their environment and other people; their relationship toward individuals in a group and their own approach to work are more important to them than group membership and work roles. It is this separate sense of self that makes leaders agents of change, whether technological, political or ideological.

Even great talent will not guarantee that a potential leader can achieve his ambitions, or that what he can achieve will benefit the world. Leaders, like artists, are inconsistent in their ability to function well, and some may give up the struggle.

Recent concern over declining U.S. productivity, declining standards of quality and the low state of the work ethos testifies to some missing element in the way Americans organize economic activity in society. I think this is directly related to the failure of modern bureaucracies to make use of one kind of leadership talent. If managers and leaders are both needed—one to maintain order by controlling the processes of strategy and operations, the other to effect necessary change by raising standards and defining future goals—we now face the serious challenge of how to build alliances or coalitions not merely between people who work at different jobs but between different kinds of personality types.

In my *Harvard Business Review* article, I used the example of Alfred P. Sloan, whose genius for management was responsible for introducing many new marketing and organizational concepts. I showed how he handled a conflict between the heads of the manufacturing companies in General Motors, who wanted to go ahead with production of a water-cooled engine that they could make easily and take to market, and Charles Kettering, who was the head of research and development and wanted more time and resources to develop an air-cooled engine. Sloan needed a solution that would not alienate Kettering. Instead of exercising his authority to make the practical decision in favor of the manufacturing heads, he threaded his way through the problem by creating a new structure, a mythical organization called the air-cooled engine company, with Kettering in charge. Sloan knew that Kettering was an inventor and not a manager and that the air-cooled engine would probably not materialize, but his maneuver was brilliant because it solved the problem so everyone concerned accepted the process rather than saw it as a win-lose situation.

Such manipulations are useful to managers when the only apparent alternative solutions would hurt the organization or interfere with its output. A leader might have plunged headlong into the conflict, relying on his own powers to steer things through to what he saw as a sound long-range solution, but he might only have aggravated the problem by holding the manufacturers at bay and blocking production in the waiting factories.

Most American managers would probably take umbrage at the notion their profession overlooks any important element. To understand why effective management is not enough, I would like to point out four management assumptions that seem to me mistaken.

One assumption is that the goals of the organization are inherently sound. Managers do not think of themselves as having responsibility for rapid changes in orientation and attitudes, but intead they perpetuate existing goals. One of the elements missing in management, as well as in our economic institutions, is a willingness to question the goals inherent in organizations.

A second assumption is that setting up structures and forms to solve problems involves no cost to the organization. There is in fact a cost that should be calculated for every structural innovation, and if we were able to calculate these, managers would less frequently manipulate structures and think more directly about the problem they are trying to solve.

A third assumption that may be wrong is that the motivations, beliefs, needs and desires of human beings are constants and will automatically support the structures that managers try to implement. I think this assumption should be questioned very seriously. There is ample evidence that human motivations vary not only according to incentives and rewards, but also with the social setting and culture of the organization.

The fourth and weakest link in the whole foundation of ideas that supports the management ethos is the assumption that behavior is predictable. We do not yet know enough about behavior, and I do not think we ever will. If behavior could be predicted, organizations could be run with a great deal more assurance than is actually possible by calculating the likely effects of doing certain things.

Leadership involves the personal effect of the leader as an instrument of change in raising the aspirations and values of other people. Leaders center their assumptions on people—why they act as they do, what they think, what is important to them—rather than on structures.

Leaders assume they can and will be responsible for directing and bringing about any appropriate change. Their primary job is to work persuasively on the values, beliefs and ideas of people who are going to be part of this change.

James MacGregor Burns, in his impressive synthesis drawn from a broad range of disciplines that have tackled the subject of leadership, shows how this "transforming" process worked in the lives of dominant world figures who changed the course of events. During periods of upheaval the leaders tapped the immediate needs and desires of constituencies and transformed them into a higher stage of aspiration and expectation that led to effective action. Burns distinguished this transforming from a transactional kind of leadership, which is kept within contractual boundaries and is based on exchange of one thing for another, such as services rendered in return for money or responsibility accepted in exchange for tenured rank. This corresponds more to the work of managers and their concern with the orderly processes and getting things done through contractual relationships in a structure with a minimum of emotional engagement.

In his book *Leadership*, Burns points out that in the past there have been two approaches to the subject: leaders are viewed either as heroic and famous figures, which is essentially an elitist and exclusive point of view, or as agents from the perspective of followers. He proposes a more realistic concept for the 20th century, uniting these two views in which the processes and interplay of leadership are seen as part of the dynamics of conflict and power, with leadership as something more than power holding. In the more complex and potent form of transformational leadership, a leader's power is based on an inherent sensitivity to followers' latent ideas and his ability to raise them toward higher goals. Interaction between leader and followers is mutually stimulating and elevating, and the change in motives and goals of both has a direct effect on social relations—and morale—ranging from the small and hardly noticed to the creative and historic.

Leadership also involves risk. In contrast to the manager's reliance on structure, the leader risks losing his authority or an erosion of his power base by putting his personal desires on the line. Nothing is as perishable as power if it is used unwisely, or held without being used. The conservatism of managers may well be based on the necessity of guarding the extent to which they risk erosion of their power base. But leaders assume, more often than not, that the impetus for action comes from within themselves rather than from an imposed structure, and accept this challenge.

Probably the most important characteristic of leaders is that they must understand themselves before they can work on others. Because they view themselves as instruments of action, Socrates's maxim "Know thyself" is fundamental to leadership. Whereas the burden of responsibility for managers is basically on the structural network of people contributing to output, the essential responsibility of a leader is to himself and to effective interaction with his constituents. Leadership is meaningless without values. An organization or hierarchy can set its values and hope to develop leaders who will articulate them, but values cannot be imposed. They must correspond to the values latent in leaders and followers that can mesh with those of the organization.

The only values that can be relied on are those that are deeply felt and have been absorbed from experience. The styles and standards that evolve from a functioning relationship between leader and followers will survive even though they may be diverse and occasionally conflicting. The healthy expression of a loyal opposition strengthens the development of durable policies in well run governments and institutions. There is no reason why democratic institutions, including corporations, cannot thrive by accepting the positive value of different attitudes, expressions, styles, opinions and personalities.

The increasing imbalance in a society weighted toward management has created a shortage of leaders in institutions. One prevalent symptom of this gap is the loss of confidence in authority. Without the bond of confidence between those in authority and those responsive to it, achieving unity of purpose or any common understanding of what a business, university or government is trying to accomplish becomes difficult.

A dangerous trend toward careerism has developed in which more often than not, people think of their own advancement or personal goals in terms of salary and status rather than the long-range effects of their work on others or on larger organizational objectives. Nothing destroys mutual confidence between a person in authority and subordinates more than an awareness that the supervisor, executive or officer is fundamentally looking out for his own self-interest. We must find ways to counteract careerism. I think it is a dangerous symptom—at least as destructive at middle and lower levels as at the top—reflecting a culture that does not adequately recognize the importance of personal or human values. If we respect power and money above personality, intelligence and ideas, we establish careerist incentives and rewards that blur the significance of personal accomplishment or of higher social goals.

Executives often reject my view that managers and leaders are different. Because complexity makes their jobs so extremely demanding, they feel that being a top manager takes more talent and ability than I appreciate. Others contend that real managers have to be leaders just to cope with elaborate, accumulated layers of hierarchies. Layers of management and review and the anonymity of staffs make it difficult to run a sprawling enterprise encompassing a tremendous range of personnel, operations, equipment and supplies and seem to require leadership in managers as well as managerial expertise in leaders. I certainly would not minimize the burdens of responsibility at these levels, or the need for talent. The anonymity so keenly felt even by top officials is, however, the product of a managerial culture that has restricted the development of networks of individual leaders as an integral force in the organization. And does not the mobility of people in responsible positions again indicate that institutions have encouraged management at the expense of leadership?

It is essential and possible to have a coherent structure of authority in which individuals view themselves as major agents of action, without readily shifting responsibility on to structures over which they have no feeling of control or personal investment. We could enhance the work ethos and the quality of production if organizations emphatically adopted the point of view that to direct people and communicate policy you must believe what you say and say only what you believe. Production indicators might rise dramatically when supervisors are encouraged to probe problems, propose improvements and stimulate those working under them to adopt new attitudes and practices. It could reasonably be expected that through more widespread use of individual example and engagement the transformational process would prove far more efficient than consultants' surveys or organizational directives.

We all know by now that the American automobile industry, for instance, cannot be turned around by cautious piecemeal solutions or structural adjustments. Not only will bold decisions have to be made, but many risks will have to be taken in adopting technical innovations. The kind of initiative needed may be outside the experience of U.S. managers, but it can be found in the personality pattern of leaders whose self-reliance and ties with their followers give them the power to steer through problems toward the decisions that must be made for long-range solutions.

It has been proposed that we should organize followers first around a set of goals or programs before leaders step forward to attach themselves to the appropriate cause. But as I have said, such a proposal fails to consider the overriding aspect of leadership: the leader's intuitive abilities and personal qualities are essential in getting followers to extend their energies and attitudes toward larger goals and values.

Historians note that leaders emerge in times of crisis, as if the crisis itself had brought them forth to satisfy a public yearning for one individual to symbolize people's hopes, desires, ambitions and determination. Apart from the disadvantages of waiting for crises to produce leaders, we can in our own time wonder whether the apparent phenomenon of crisis leadership is as dependable as it seems to have been in the past. The opposing influence of bureaucratic structures may have been too effective. Institutions will have to determine not only how they can encourage and develop leaders at many different levels, but where the particular gaps are that leaders could most effectively fill.

"How do we recognize leadership? And do we understand it?" managers ask. It is true that we cannot pinpoint potential leaders in advance, but we can give them opportunities. Mentors can test the willingness of younger people to shape and mediate conflict and to step forward with their own criticisms and proposals for work problems—especially where structural solutions have not worked.

In the early days of the American republic an astonishing number of great men were prominently active in public life. Before schools of law, medicine, science and technology had been established, the political arena was virtually the only field open to men of talent, so they concentrated there and shone brilliantly. The talent they represented is widely diffused today through many specialities in the arts, sciences and professions, but it is far less conspicuous in the bureaucracies of those institutions that shape social standards: business, education, government.

It is a mistake to assume that people have changed from one generation to another and can no longer respond to initiative. Our system of training and educating people has denied a certain kind of leadership talent enough significant participation in the life of the organization. Managers, teachers and people in responsible positions in the society can recognize potential leaders more easily when they understand that freely developed personal relations between supervisors and subordinates can benefit the culture of the group, that questions and challenges can yield results, and that encouraging experimentation can produce a more dynamic environment where talent can grow.

Is it an elitist concept to train selected individuals to become leaders because of talent, personality and potential influence over followers? Americans have always felt a tension between the polarized ideals of looking up to a select group of leaders and participation in a democracy.

That fundamental tension between elitist and populist viewpoints tends to focus on a version of leadership representing either extreme. As a result we do not think much about the many effective leaders who have functioned importantly in their own time and place, but who have not captured headlines or appeared in history books. I think it is time to separate the term "charisma" from the concept of leadership. Charisma leads but can also mislead followers. It is not a necessary ingredient of leadership and certainly inclines toward elitist and mystical conceptions, as well as singling out certain leaders and diminishing others whose influence on followers may have been as enduring and significant.

Above all, charismatic leadership as a concept diverts attention from the important educational function of leadership. The energy and time expended in trying to bring out a talent for management in leaders, or leadership traits in good managers, could be allocated more realistically to teaching managers and leaders to understand their different approaches to work relationships without becoming destructively competitive, and for each to see the need for the other. This would also focus more attention on how to overcome the many obstacles to early identification of leaders.

The U.S. management culture is based on the rational principle of contract, which binds individuals to terms covering an exchange of something for something else without further infringements on their freedom. Contractual relationships are the key to a democratic economy and the free enterprise system, although extending the principle of contract into all family or community relationships tends to leave people deprived of the benefits of important human relationships.

The leader—manager distinction has been viewed by the sociologist Charles Moskos as a contrast between commitment to the institution, whose purpose and values transcend self-interest, and to occupational categories, where responsibilities are purely contractual, exchanging work for cash. I think this may miss the important potential synergistic effects of leadership and management in improving the ways in which people approach work and the solution of problems. Although executives' personal goals, according to this theory, are more explicitly linked to institutional goals, the relationships with followers that leaders can develop in the professional and occupational categories could be at least as significant to the character and quality of the organization.

A more useful analogy might compare the effects of leaders and managers to those of strategy and operations, with strategists staking out the direction, relative position and objectives of the organization in its competitive setting, and operations managers dealing with current applications and implementation of specifications and programs. Strategy is the job of projecting into the future: surveying a company's situation and deciding between alternative courses of action with many possible consequences. Operations coordinates the work of implementing decisions that have been made and getting the job done. Strategy corresponds to leadership in making decisions and taking actions that affect others, while operations corresponds to the many interrelating responsibilities of management.

This analogy suggests how the synergistic relationship between strategy and operations would apply also in a fully functioning relationship of mutual respect between leaders and managers in large organizations. To view the distinction as one between ideals and commitment, on one hand, and occupations and material self-interest, on the other, seems to oversimplify and even distort the real difference.

The notion that managers deal with things and leaders deal with people is another oversimplification. Managers deal with a great many people and have to be aware of their needs. The difference I would stress is that managers deal with people in interacting groups, aiming at consensus agreement and on the whole minimizing the one-to-one relationship that is essential to a leader's makeup. Both managers and leaders can contribute to a society and its institutions. The art of business management has obscured the importance of personal initiative and leadership by its emphasis on structural arrangements, processes and order, to the point where personal leadership needs to be retrieved and drawn out in individuals whose talents predispose them in that direction.

Experimenting with one-to-one relationships, such as apprenticing junior executives to senior mentors, could inject a healthy elixir into the managerial culture. Peer alliances, through which corporations attempt to differentiate responsibilities equally among persons of equal status, theoretically promote learning uninhibited by the restraints of authority or criticisms of superiors, but I believe such alliances consistently develop team players rather than the kind of individual who might become a leader. In a one-to-one relationship with a superior, a junior executive can learn first hand about power, performance and integrity. These relationships could teach senior executives that a direct exchange of ideas, open challenges and the competitive impulses of subordinates can be creative and stimulating without shattering their own authority. Furthermore, apprenticeships prepare individuals to move more rapidly into strategy-related positions where they can put their ideas to work.

To undergo the necessary transformation in this decade, managers will have to accept the feasibility of working alliances with leaders who question old practices and propose new solutions, and to consider the link between them as essential as the link between strategy and operations. While guarding against the cult of elitism, managers must nevertheless lean toward a culture of individualism. Only when the values of an organization also can be expressed as the personal values of those within the organization can they have any real meaning. □

Reflections on Boredom

By ROBERT NISBET

In this essay, eminent scholar Robert Nisbet discusses the history and sociology of boredom, and speculates that mankind first experienced this phenomenon when people made the transition from a nomadic life to agriculture and "the tyrannies of soil and season." Nisbet, a professor emeritus of Columbia University, is the author of many books, including *The Quest for Community, Twilight of Authority* **and** *History of the Idea of Progress.*
This essay is drawn from Nisbet's most recent book, *Prejudices: A Philosophical Dictionary.*

AMONG the forces that have shaped human behavior boredom is one of the most insistent and universal. Although scarcely as measurable a factor in history as war, disease, economic depression, famine and revolution, it is far from invisible in either the present or the past. A stream of chronicles, diaries, memoirs and biographies yields much information on attacks of boredom and their consequences as well as on antidotes or preventives.

Man is apparently unique in his capacity for boredom. We share with all forms of life periodic apathy, but apathy and boredom are different. Apathy is a depressed immobility that can come upon the organism, whether amoeba or man, when the environment can no longer be adequately assimilated by the nervous system, when the normal signals are either too faint or too conflicting. It is a kind of withdrawal from consciousness. Once sunk in apathy, the organism is inert and remains so until external stimulus jars it loose or else death ensues.

Boredom is much farther up the scale of afflictions than is apathy, and it is probable that only a nervous system as highly developed as man's is even capable of boredom. And within the human species, a level of mentality at least "normal" appears to be a requirement. The moron may know apathy but not boredom. Work of the mindlessly repetitive kind, which is acceptable to the moron, all else being equal, quickly induces boredom in the normally intelligent worker.

Work, more or less properly attuned to the worker's aptitudes, is undoubtedly the best defense against boredom. As scientist Dennis Gabor emphasized, work is the only visible activity to which man may be safely left. John Maynard Keynes observed: "If the economic problem is solved, mankind will be deprived of its traditional purpose. Will this be a benefit? If one believes at all in the real values of life, the prospect at least opens up the possibility of benefit. Yet I think with dread of the readjustment of habits and instincts

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Excerpted from *Prejudices: A Philosophical Dictionary,* Harvard University Press, 1982.

of the ordinary man, bred into him for countless generations, which he may be asked to discard within a few decades."

There have been workless strata before in the history of society. Think only of the half-million in imperial Rome on bread and circuses out of a total of two million people. The results were unsalutary, to say the least, and historian Arnold Toynbee gave this "internal proletariat," with its bored restlessness, its unproductivity and its rising resentment of the government that fed it, credit for being, along with the "external proletariat" or invading barbarians, one of the two key causes of the eventual collapse of the Roman empire. In the modern day, chronic joblessness, especially among youth but in other strata as well, not overlooking the retired elderly, produces its baneful results, ranging from the mindless violence of youth on the streets to the millions of elderly who, jobless and also functionless, lapse into boredom which all too often becomes apathy and depression.

As Gabor further observed, man's central nervous system evolved over millions of years, during which alertness, vigilance and aggressiveness were necessary to survival. Being necessary, these traits were bound to enter the very essence of man's nervous system. If, as is widely assumed by biologists, few if any significant organic changes have taken place during the past 5000 years, there is certain to be something of a traumatic effect on most people from enforced idleness, unwonted leisure, security from predators or relative abundance of food. Boredom is in sum a response of the human brain to conditions alien to its long formation.

Satiety is doubtless a key element in boredom. Someone has written that the only thing worse in life than not getting any of what one has struggled for is to get all of it. Boredom is almost certainly the secret canker in utopias, as Arthur Schopenhauer warned. Behaviorist B.F. Skinner seemed to think that positive reinforcement would ward off all social ills, but he forgot about boredom with perfect freedom and virtue. George Orwell in *1984* did not forget, and his people stay content and passive only through endless gin. Aldous Huxley in *Brave New World,* for all his utopians' genetically formed safeguards, nevertheless provided them with supplies of the drug Soma to raise the spirits of the depressed or bored. In sum, utopians too can lead "lives of quiet desperation."

Boredom resembles authority in one respect. The closer and more confined the setting, the greater the pain to the victim. The worst of tyrannies exist within the intimacies of life, and the same holds for life's boredoms. The very closeness of the relationship gives added poignancy to the individual sentiments or emotions aroused. If one had to choose between absolute despotism in a large country or a small, the former is to be preferred. Its very size makes possible interstices in the net of power which are unlikely in a small tyranny. Similarly, nothing bores like the small group, the intimate relation from which one has become in some degree estranged yet to which one is still bound and confined. There is a large literature on the intolerable boredom generated by small towns where public opinion has a thousand eyes and ears, or by jobs whose monotony leads to mental breakdowns, drugs and drunkenness. One shudders at the thought of the boredom induced on the farms of

America in the 19th century, especially on the endless flat plains of the Middle West. Cabin fever, as boredom is known colloquially, comes from being pent up for long winters without recreation or even work.

Of all the primary relationships, marriage is probably the most fertile in its yield of boredom, to wife perhaps more than to husband if only because, prior to recent times, her opportunities to forestall or relieve boredom were fewer. There is another side to this, however, and the recent evolution of the Western family is pertinent. In very large degree, as a result of the Industrial Revolution and the transfer of economic functions once embedded in the family alone to other institutions, the family has largely ceased to be the microeconomy it once was, with each member holding occupational as well as kinship roles. By loss of its ancient economic foundations the family has become almost entirely a purely personal relationship. In marriage, this can and does make for closer, more intimate personal relationships of love than were perhaps possible in a domestic economy. But such intimacy of personal relationship, unrelieved by economic functions, can also—and it plainly does—multiply the sources of tension, of conflict and of the onset of paralyzing boredom of mate with mate. Again, work or division of work, mandatory work, can be salutary when personal bliss has been succeeded by personal tension and ennui. Quite possibly God expelled Adam and Eve from the garden and into the perilous unknown as a way of warding off the boredom that might have come with marriage-in-utopia and perhaps fruitlessness.

Being educated, being an intellectual, does not insulate one from feelings of monotony, tedium and satiety. Doubtless Hamlet, "sicklied o'er with the pale cast of thought" and finding "weary, stale, flat and unprofitable...all the uses of this world," is the heroic example of this.

Although the net effects of boredom in history are probably malign, good has also been served by this state of mind. Many an evil dogma, doctrine or other intellectual continuity has in the end been undone, not by assault, but by boredom on the part of its victims. It is boredom above anything else that brings literary continuities to a welcome end. The public is grateful for Milton, but deplores the Miltonians. So it is with the ascendancy of political parties: the more powerful a party-in-office becomes, the greater the boredom it produces in the public mind.

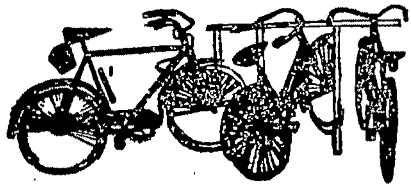
The sense of emptiness of life is pronounced in almost any onset of boredom. Samuel Johnson, for all his prodigious expenditures of energy, was in almost constant dread of what he called the "vacuity of life." Second only to his fear of the disease of envy was his fear of the psychic affliction under which one sees everything as meaningless, futile or superfluous. In *Rasselas* he described the pyramids of Egypt as monuments of royal boredom, constructed from the torment of thousands of workers over protracted periods for the purpose of relieving the pharaonic burden of satiety.

Enforced separation from a cherished vocation is a sure recipe for boredom. Much damage was done upon the public weal in ancient Rome when the legionaries were temporarily out of war, chafing to get back to work, making the civil population feel their enforced idleness cum boredom. The knights of the Middle Ages were more dangerous to society when they were not in combat, for the onset of boredom at home could be formidable, its toll commencing with the knight's own wife and children. Ghastly though the American Civil War became in its unending slaughter and epidemic disease, there was no end to the lines of young men fleeing the deadly monotony of farm and village for enlistment under one banner or the other. Boredom even within combat circumstances can drive field soldiers as well as officers into tactics or individual acts bound to yield a heavy harvest of fatalities. Stupidity should not be taken away from the generals of World War I, on both sides, for their appalling movements of vast armies over a few hundred meters of terrain; but neither should one forget the inevitable, galling tedium of trench existence. In sum, war can engender as well as give release from boredom.

There is a history as well as a sociology of boredom. It must surely have been first felt by man when he made the transition some 20,000 years ago from a hunting or pastoral existence to village life and the tyrannies of soil and season. It is one thing to be mobile, in constant search for security and food. It was something else to face the sheer drudgery of tilling and harvesting and the monotony of life in the village. The word *paradise* comes from the Persian, where originally it meant "wilderness," and there is no doubt a lesson there.

Very probably play came into existence as an anodyne to the tedium of life. The principal function of ritual in primitive society, it has been suggested by anthropologists, is to prevent boredom. Ritual punctuates the long and dreary sameness of life. Calendars began, indeed, in the listing and timing of rites and feast days. Through history and among all peoples religion generally has been a major antidote to what would otherwise be the sense of world-weariness, of passive indifference to life, in a great many minds. The religious "awakenings" which fill the history of religion in the West since the late Middle Ages have their roots, in some degree at least, in the desire for ecstatic release from tedium. Life on the agricultural frontier in the United States could be grim indeed in its relentless tedium, and along with religious enthusiasm, a desperate desire to escape this tedium lay behind the innumerable revivalist camp meetings of the 19th and early 20th centuries. The very word *revival* suggests that psychological as well as religious inspiration was sought and given.

As for the future of boredom, astronomer and educator Harlow Shapley ranked boredom third in a list of possible causes of the destruction of civilization, a list that included nuclear war, natural catastrophe and pandemic disease. And philosopher Bertrand Russell concluded: "If life is to be saved from boredom relieved only by disaster, means must be found of restoring individual initiative not only in things that are trivial but in the things that really matter." □



The Computer and the Educated Person

By EDWARD H. TENNER

As the computer revolution moves ahead, more questions are being raised about the machine's role in education and its potential impact on the intellectual processes of thinking and learning. Edward Tenner discusses some of the changes brought about by the earlier inventions of writing and printing, and assesses the current effects of the new computer age on literacy and the educated person. Accompanying the article are additional comments on the computer age which originally appeared in the scholarly journal *Daedalus*. Tenner is science editor of the Princeton University Press and a contributor to *Harvard Magazine* and *The Chronicle of Higher Education*.

THE American educational scene always seems to reflect current issues and to respond to changes in the priorities of society. Two decades ago the emphasis was on space and the state of scientific education, then on the Vietnam War and the social responsibilities of the schools. Today it is on the computer, and already the effects of the computer revolution are so extensive that we must redefine our concept of what constitutes an educated person.

Only a decade ago, computers were large, forbidding affairs, sequestered by technicians and operated by data and instructions fed them in mountains of punched cards. Then only specialists and a few professors and students with extensive data to process or complex computations to execute mastered the awkward programming languages necessary to operate the computers.

It did not take long for computation to lose its terror. Time-sharing terminals gave university users access to ever more powerful central equipment, in effect furnishing each user with a private computer. Newer languages like BASIC and LOGO let anyone learn simple programming in a few hours. Classrooms, faculty offices and even dormitories began to sprout terminals.

Today the demand for computer power seems almost boundless, but concurrently there has been a renewed emphasis on traditional writing and mathematical skills. The impetus for this movement is coming from students, young teachers and parents, and nothing has helped promote that demand so much as the availability of personal computers with programs that can accurately and swiftly be applied to both computational and text-processing work. These microcomputers can be linked to central university facilities, and so help to solve the particular problem of academic computing—the very sharp peaks of demand near the end of each term, when assignments fall due. As a result, faculty and students have been buying microcomputers at such a rate that there are still no reliable statistics, though one survey has revealed that a quarter of the Stanford University faculty already has home computers.

The next step is clear—a micro for each student. Already some colleges are beginning the shift to micros—Dartmouth in New Hampshire, Clarkson College of Technology in New York, Drexel University in Pennsylvania, and the Stevens Institute of Technology in New Jersey. Carnegie-Mellon University and the IBM Corporation are developing a superpowerful micro that all entering freshmen will be expected to buy by 1985.

At the secondary- and elementary-school levels, the potential for microcomputers seems to be limited only by the cost involved. About 100,000 computers already are in use below the college level, and manufacturers estimate that there will be 300,000 to 650,000 by 1985. Of the 82,420 school buildings in the United States, 24,640 or about 30 percent already were using computers for instruction in 1982-1983, an increase of 56 percent over the number using computers in 1981-1982.

All this makes it clear that by the early 1990s, nearly every person now being educated will have some computer experience. But what difference will computers make to the definition of an educated person and to the nature of both general and professional education? What part ought they to play? And what influence will they have on the thinking habits of the estimated 50 percent of the workforce of industrial countries who will be working with terminals by the year 2000?

We can identify two kinds of technological change. One lets us do the same things more quickly or cheaply. The other leads us to do different things and perhaps even to become in some way different people. The revolution in spinning and weaving technology around 1800, for example, brought great economic change in Europe and North America but did not bring a comparable social revolution. On the other hand, railroad networks did affect profoundly our notions of time, distance and travel, and brought structural changes in the commercial and residential use of space. Telegraph services and typewriters made business communications more efficient; telephones brought new kinds of interactions, not simply greater speed.

In computer futurism, the lines are already drawn between those who see data processing as a tool that will let us do better what we are doing now—a technological transformation—and those who regard it as the basis of a new "information society"—a conceptual change. Interestingly, those who foresee the most far-reaching changes tend to be optimistic about them; those who are more conservative about the impact of computers are often more concerned about potential abuse. Herbert Simon—Nobel prizewinner, professor of computer science and psychology, and one of the most distinguished "optimists"—has written of a "third information revolution" comparable to the "energy revolution" that made industrial society possible. To get a better sense of the computer's impact on educated people, let us turn back to the two other information revolutions Simon identifies: printing from movable type, and writing itself.

Printing is especially instructive. Historians used to consider it one of the great innovations, comparable in its impact to the Voyages of Discovery. A few authors still do. Historian Elizabeth L. Eisenstein of American University recently argued that "the communications shift altered the way Western Christians viewed their sacred book and the natural world. It made the words of God appear more multiform and his handwork more uniform. The printing press laid the basis for both literal fundamentalism and modern science."

But Eisenstein, Marshall McLuhan and others are in the minority now. There is strong evidence that the early printed book did not bring about an immediate change in either elite or popular consciousness. Early books gradually became handier to use than manuscripts thanks to the reading aids, like headings and tables of contents, that the new typography helped make possible. Yet they remained expensive. Personal and institutional libraries grew, but not exponentially. Even in the late 18th century, Edmund Burke reportedly estimated the size of the (educated) British reading public at only 80,000. Whether or not this estimate was accurate, the fact is that the potential of printing to reach a truly mass audience was not reached until well into the 19th century—400 years after its invention.

What is much more impressive today is the change of mentalities before Gutenberg, without the benefit of any new technology. Historian and bibliographer Paul Saenger of Northwestern University has suggested that the separation of words in medieval manuscripts—unknown in classical Roman manuscripts—had helped begin the new habit of silent, private reading that gradually replaced the oral group reading of texts that had prevailed in early medieval schools.

All this may seem to have little to do with computers and the educated person, but if Saenger is right, there is an important lesson. Contrary to what technological prophets have assumed, fundamental changes of intellectual habits can occur without important material innovations and perhaps also without great social changes. Conversely, a technological change may have intellectual effects only in proportion to its availability to large numbers of people.

In any case, printing is an example of a great convenience and economy that led to no significant change in the curriculum and to only gradual long-term changes in reading habits. Yet when printing became cheap enough in the 19th century, it did make possible the existence of a new mass literacy and mass literature that had a great effect on the nature of writing and on education.

Writing itself is a different matter. Perhaps we sometimes exaggerate its effects because the societies we know best are those that leave written records; but these surely are different and more complex societies by virtue of their literacy. Masterpieces of poetry and music can exist without transcription—still a problem for the dance—but commerce and administration as we know them are impossible without written records.

Psychologists once thought that literacy led to remarkable changes in human thought, especially to a new capacity for abstract and symbolic thinking. Some thought that illiterate people could not generalize. Today there is evidence that urbanization and school attendance may be at least as important in shaping cognitive style as actual literacy. And even today, a few highly intelligent people in industrial societies remain illiterate through years of schooling yet are able to perform surprisingly well as managers or professionals.

Still, few would deny that written language changed drastically the nature of learning and created a new definition of education. Memory and face-to-face exchange lost some of their importance; access to a larger body of recorded texts and composition of new ones created new scholarly and professional roles. For example, a study indicated that the multiplication of official documents in England from the Norman Conquest to the beginning of the 14th century slowly affected the mentalities of lay and clerical elites. The living wisdom of the community, as embodied in memory, began to yield to written and dated papers as a standard of truth; every important event or transaction had to be recorded.

All this seems to be far removed from computer skills, but it really is not. As the literary critic Walter J. Ong has pointed out in *Orality and Literacy: The Technologizing of the Word,* Plato's criticisms of writing in *Phaedrus* and in the *Seventh Letter* are repeated in today's objections to the computer: that it is a counterfeit of human intelligence, that it weakens the mind's memory and

What difference does it make if we read texts displayed on a computer screen instead of on paper printed with ink? The computer certainly does not guarantee deeper comprehension, greater subtlety of mind or a wider range of imaginative reference. The mediation of a computer, however, puts new powers at the disposal of intelligence. For one thing, the computer itself can do simple reading—it can "read" an immense body of literature in search of designated words. As anyone knows who has ever spent days in libraries in search of errant information, simply identifying relevant sources absorbs inordinate amounts of time in research. The objection may be raised that a search of texts by computer may block the serendipitous discoveries that occur while browsing in the stacks of great libraries. No member of the academy need fear that the use of a computer will keep him from the stacks....

The great deficiency of libraries, as we know them, is that while titles are catalogued, the libraries have no master indexes of the contents of books. Individual volumes, it is true, have indexes, often of inferior quality, but even the best indexes must be examined one at a time. The great advantage of an electronic library is that a computer could search and analyze its contents without proceeding volume by volume. As work in artificial intelligence develops, computer systems may also become adept at more complex tasks, such as summarizing texts, which has been accomplished experimentally....

The microprocessor, invented only in the early 1970s, opened up radically new possibilities for the use of computers. Other developments, now unforeseen, may also change ideas and expectations. But even with what is now available or on the horizon, it is clear that the new technology can contribute significantly to scholarship, science and the circulation of ideas, if we can put aside prejudices about computers and exploit their possibilities as a medium of culture as well as information.

—Paul Starr, professor of sociology

capacity for work, that it cannot explain itself, discuss or debate. But as anthropologists Jack Goody and Ian Watt have suggested, writing also made possible critical history, syllogistic logic and scientific investigation.

Today some hope for comparable intellectual benefits from computer use. In fact they urge "computer literacy" in the college and even in the elementary school curriculum. The chairman of a faculty committee at the University of California at Berkeley has declared that "understanding the principles behind computer science is an essential part of a liberal arts education today" and has recommended shifting money from humanities and social science departments to meet the student demand for computer instruction. When a New York professor of English scoffed that "there is something myopic—and quintessentially American" about fascination with computers, the magazine that printed his essay was deluged by letters denouncing his suggestion that computers were competing with rather than enhancing the traditional goals of education.

Let us disregard for the moment the abstract principles of computer enthusiasts and skeptics and look more closely at specific computer applications. The *idea* of a computer is 150 years old; its current popularity derives from its diversity of *users.*

At least in science and education, no use is as significant as quantitative analysis. Today, even modestly priced computers can do work that formerly required days of laborious calculation. Perhaps it is just a matter of time; the point has been made that the United States built an atomic bomb without using electronic computers even though this probably required more computations than all the astronomers in world history had made until then. At the frontiers of science, computers are permitting the development of new branches of mathematics, geophysics, biology and other subjects; but they also make possible great changes in the scientific education of non-science students.

In a 1981 position paper, Stephen White of the Alfred P. Sloan Foundation, a leading supporter of scientific education in New York, urged that the analytic skills of applied mathematics, along with technology and the elements of computer science, be made a central part of the undergraduate curriculum. "What the computer has done," he argued, "...is provide scope for analytic skills that never before existed, and in so doing it has altered the world in which the student will live as well as the manner in which he will think about the world."

One of the most interesting published responses to this paper came from Donald L. Kreider, chairman of the mathematics department at Dartmouth College, where nearly all students already make significant use of computers and where almost 90 percent take at least one mathematics course. He suggested that computers permit "a marriage of pragmatic skills and theoretical structure that has eluded teachers for generations." Some powerful procedures for solving equations were rarely used because they were impractical for paper and pencil methods; as computer algorithms they give students new insights into the fundamental concepts involved.

Ironically, there is still only scattered quantitative evidence that people learn mathematical ideas any better with computers than they do conventionally—

in fact, the evidence that they learn anything better is still disappointing. But they clearly *feel* better *about* learning, and at Dartmouth more students have chosen to concentrate in mathematics since the introduction of computers in

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We now see centers of higher learning using computers in the liberal arts. Classics scholars at Princeton are studying Virgil with the help of a computer programmed to scan the text quickly, picking out passages that contain the same words used in different contexts. This reduces the drudgery, they claim, and allows them more time to study the meaning. Dartmouth applies similar analytical techniques to the Bible and Shakespeare. Apparently, students are integrating this technology into their academic lives as easily as they did the simpler calculator in the last decade....

In the near term, we might profitably think about computer skills as additional proficiencies in the bundle we call literacy. Note that I have referred to computer skills as additional to, not replacements for, existing skills. Reading and writing will continue to be essential; computer memory may replace some paper and file drawers; but we still have to compose sentences for a documentary format. Slightly further out, however, writing—meaning composing with pen in hand or fingers on keyboard—may become less necessary. Although still far from perfected, work on voice recognition by computers is proceeding rapidly....

It is likely that we are on the verge of yet another step in the evolution of literacy. Yet we can feel confident that whatever comes about will not replace existing skills, but supplement them. Neither the printing press nor the typewriter replaced either speech or handwriting. The electronic hand calculator has not replaced the need to understand mathematics, though it may reduce the need to memorize multiplication tables. The new literacy will likely involve a greater emphasis on the visual, but only as a continuation of the trend that has involved the improvements in photography, printing techniques and television.

Above all, the new literacy, whatever it looks like, is not to be feared—first, because it will come about regardless of what we think about it; second, because for any threat to some existing institution or relationship, the new literacy will provide equal or greater opportunity; third, because change brought about in part by technology takes place incrementally, and adjustments by society and individuals will evolve naturally.

I remain haunted, however, by how a 16-year-old reporter for Children's Express, *a newspaper published entirely by schoolchildren, characterized the Fourth Assembly of the World Future Society in July 1982, whose theme was the new world of telecommunications: "I think the message was clear that it's really our [young people's] world. I was kind of laughing at the people here. This technology, all they talked about, they really couldn't grasp. This belongs to us."*

—Benjamine Compaine, information expert

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the department's courses. As teaching methods are changed to take advantage of computer capabilities, we can expect that educated people will become more sophisticated mathematically.

It is customary to describe a reservoir of knowledge to be disseminated electronically as a "databank" or "database." This is significant, for it reveals the assumption that important knowledge consists of an accumulation of discrete facts, and that the function of at least this medium of information is to select out of the accumulation and deliver the individual facts or collection of facts that have been called for. It assumes that the needs and mode of thought of an inquirer are analogous to those of someone who looks up a number in a telephone directory or consults a dictionary, not those of someone who reads a novel or a biography or a poem. And the oft-expressed conviction that the computer will make the book obsolete reveals a perhaps unconscious, but arid and constricted, belief regarding the nature of important knowledge and important communication.

This is not to question the major and very valuable social roles in communication—roles quite beyond the power of print and reading—that the audiovisual media and computer will play....There can be no question that the audiovisual media have extended and enlarged, for untold numbers of people, an awareness of other lands, other times, other ideas than their own. So, too, has the computer given us powers without which modern society could not operate, and has enhanced immeasurably the capacity of human intelligence to analyze and organize experience. But neither provides what reading offers as a bridge to the universe of experience beyond our daily ambit. The one can bathe us directly in the unexamined flow of experience, but without the processes of abstraction and organization that give it meaning. The other can give a command over discrete facts scraped bare of penumbral meaning, but does not provide the holistic gathering of experience or endow it with a human conceptual structure.

—Dan Lacy, publisher

The computer's single most important impact on education will be in allowing the student to participate more actively in the educational process. In much of education, the student is a passive absorber of knowledge, and there is only an occasional opportunity to work out a "canned" exercise. When spending hours at the computer terminal becomes a routine part of education, the student will be an active participant, able to initiate changes and influence the direction of his or her education.

—John G. Kemeny, professor of mathematics

Different questions about the nature of education are raised by the computer's ability to retrieve information from a great variety of data bases. Studies of medieval England have shown that even after the spread of literacy, memory remained vital; in fact, historians believe that only in the later 16th century were there so many books that complex systems of memorization were no longer necessary. And there was a price for easier acces to information. The old mnemonic techniques had given scholars the power to recall hundreds of random names. Now they were nearly lost, confirming Plato's warnings about writing 2000 years earlier.

Today anybody with a terminal and telephone line can subscribe to hundreds of news, data and information services. Even reference books are now available on line. Clarkson College of Technology in Potsdam, New York, recently opened a four million dollar "Educational Resources Center" to replace its traditional library. Wherever possible, it is replacing books with microforms and eventually electronic data retrieval.

Futurists like the late Christopher Evans have no hesitation in predicting the ultimate disappearance of books, but I find such predictions of the end of books and printed journals hard to take seriously. But educated people certainly will treat information differently. It would not be surprising if new kinds of professional communication—neither letters nor articles but something in between —emerged to take advantage of the unique abilities of computers. People will almost certainly grow even more accustomed than they are now to taking their professional reading in short articles rather than books.

On the darker side, computer-based information technology may create psychological and economic barriers to pre-electronic writing. The MIT physicist Philip Morrison has observed that in preparing a world tectonic map, seismologists had to omit all data obtained before 1961 because it was not easily available for computer processing. Morrison noted in a recent article in *Technology Review* that the statistical loss was small and the gain in understanding large, but "so cavalier a dismissal of the entire history of a science is breathtaking." Citing this article in his book, *Computer Power and Human Reason,* the computer scientist Joseph Weizenbaum added with some justification: "The computer has thus begun to be an instrument for the destruction of history. For when society legitimates only those 'data' that are 'in one standard format' and 'can easily be told to the machine,' then history, memory itself, is annihilated."

Will readily accessible information of uneven quality make the older literature so *relatively* hard to use, even with the best computerized aids, that educated people will not consult it? I must side with the pessimists and say that the educated person of tomorrow will probably overlook some ideas of earlier generations and duplicate research even if a handful of key texts are made available electronically. This has been happening in the professions, science and scholarship since World War II even without the benefit of computers. It will now happen faster, especially as the older printed literature disintegrates physically.

So far we have seen good evidence that the computer will affect education at least as much as printing did. And like printing, and in fact literacy itself, it will strengthen some skills and weaken others, But can computers take the place of educated people? Again, futurists like Christopher Evans claim they can.

They point, for example, to computer programs that diagnose some diseases as accurately as physicians and to others that can simulate the thought processes of lawyers and engineers.

To many physicians in particular, the substitution of computer diagnosis for human judgment and concern is immoral. But just as writing did not stop singing—nor printed textbooks lecturing—so the multiplication of professional analysis by computer programs will not end the professions as we know them. What is much more likely is a sharper division of professions into an elite general staff that creates analytical software and a junior officer corps that applies it. The transformation of pharmacies by the modern drug industry may be a precedent.

Yet are professionals, and educated people generally, going to become only or mainly processors of information? Is information processing really the basis of learning, as the most zealous computer advocates suggest? There are grounds for doubt. It is a truism that the best information and the most powerful techniques cannot give us values. Yet are not values precisely what both Left and Right find most lacking in education now? If quantitative skills and computer-based techniques are made the center of education, will humanistic questions not be shifted permanently to the periphery?

But even the power of computer-based techniques is in question. The rulers of every industrial nation, with access to unprecedented data banks and econometric advice, still seem baffled by the world's industrial and financial woes. What computer software could have predicted the formation of OPEC or the outbreak of the Falklands War? And academics are also disappointed with their new computational powers. Historians, for example, have been turning from demography and other "hard" techniques to the "soft" analyses of social anthropology.

Recently I read about a midwestern police chief who complained that his officers were so busy checking license plates for overdue traffic tickets that they were neglecting to investigate the serious crimes against which computers still could help little. I see a lesson for education here. Once people see what computers can do, they need no requirements or even persuasion to embrace them. But they sometimes need reminding that being educated means in large part dealing with the questions that resist computer-based techniques. Computers have been better at making scientific and technological improvements than at tackling complex political decisions, moral issues, artistic creation and esthetic judgement. Ironically, the scientist/manufacturer Seymour Cray—whose supercomputers are so fast that it takes clusters of smaller conventional computers to feed them information—develops his most advanced designs with pencil and paper.

Let's turn back to the two "information revolutions." Writing endowed the word with a life independent of the speaker's. Printing eventually permitted the almost limitless multiplication of the word. One changed qualitatively, the other quantitatively, the ways of education and the educated. Computing will fall somewhere between the two in its impact, but I think it will be much closer to printing. ☐

An Interview with Norman Mailer

Ten years in the writing, Norman Mailer's new book *Ancient Evenings* was published in April 1983. For Mailer, who turned 60 in January 1983, this book marks an important transitional point. After more than a decade of nonfiction, a big novel—the first of a planned trilogy—brings Mailer back to the literary genre in which he made his name. An excerpt from this novel follows the interview. Pulitzer Prizes in 1969 and 1980 for the nonfiction works *Armies of the Night* and *The Executioner's Song* (not to mention additional awards for these and other books) have affirmed Mailer's standing in contemporary American letters. His public posturings and activist politics have colored his reputation, but two dozen books, three films, a play and countless articles bear witness to his energy and resourcefulness. Born in Long Branch, New Jersey, in 1923, Mailer grew up in Brooklyn, and entered Harvard University at 16. Although he took his degree with honors in engineering sciences, he was already bent on becoming a writer. In college his output had included more than 30 short stories and two unpublished novels and plays. Mailer was drafted in January 1944. He ultimately served in the Philippines as a headquarters clerk and an infantryman. Based on his war experience and published in 1948, his novel *The Naked and the Dead* made him suddenly famous at 25. So began one of the most important, notorious and mercurial careers in postwar American literature. Robert Begiebing, who conducted this interview, is a teacher, poet and author of *Acts of Regeneration*, a study of Norman Mailer published in 1981.

You once said you started writing at about seven—a long 300-page story about a trip to Mars. Then you quit. You began again about the time you were at Harvard. If your secondary-school interests weren't particularly literary, what were they?

I built model airplanes all through secondary school. I wanted to be an aeronautical engineer—that was my prevailing interest. The books I read then were certainly not literary. I wasn't a literary man in any way.

What happened that you went to Harvard an aspiring aeronautical engineer,

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and came out heading for the Pacific and wanting to write a great American war novel?

I think really the main influence was a literature course, because we were given James Farrell's *Studs Lonigan* to read. And that turned me on my head because Studs Lonigan grew up in a much tougher environment than I did, but there was still a similarity. He talked the way my friends and I talked in Brooklyn. And I realized you could write about those kinds of experiences and that was almost endlessly exciting. Dos Passos, Hemingway, Fitzgerald I also read in my freshman year. By the time that year was over I wanted to be a writer. It just took another year before I was so certain I wanted to be a writer that I knew I'd never be an engineer.

It came to you at Harvard that there was an "establishment"? That's a theme that comes up again and again in your work.

In the part of Brooklyn I came from...in the public school I went to, even at Boys High, there was no feeling at all of an establishment. But by the time I got to Harvard I had to realize that an establishment was immense, was subtle, did not have a face, you couldn't even feel it particularly. The only way you were aware of it was that people were terribly serious about their education. And in Brooklyn I was always a little ashamed of being smart—somehow you weren't manly if you were smart. At Harvard it was the other way around. You were ashamed because you were maybe not smart enough. There were always people who were more brilliant than you, and who were admired, vastly admired.

I have to separate the Harvard establishment from other establishments. I'm not so sure that you shouldn't have an establishment, that establishment isn't necessary. That question is one of my obsessions, if we define obsession as a matter to which one always returns. I've pondered the question of establishment all the time. Is it good? Is it bad? Should we have an establishment as such? After all, what you are talking about is the manipulation of people by other people. That's the side which you have to question, the manipulation. Is it finally an absolute evil or a partial evil or a human necessity?

If we accept the idea of an establishment, then no question Harvard has the best establishment I've ever encountered.

And after you got out of Harvard?

I went into the army nine months after I graduated. I was also working on a novel and kept hoping that I'd have that much more time to finish it.

You mean *Transit to Narcissus*?

Yes. That got written in the nine months before I went into the army. But then there were two years in the army and that was a great change. And so was the success of *The Naked and the Dead.* In effect I encountered three sizable shocks during a period from 1939 to 1949. In those 10 years my life was transplanted three times. It was really not a shock of brutality or tragedy. There was nothing designedly cruel about it. It was the kind of shock that a plant would feel if lifted up from one bed and put into another.

Are there things that you are aware of that happened to you that would help explain the dramatic change from your studious, disciplined boyhood self to what, starting in the early and mid-'50s, is your infamous self, the renegade, the ranting critic of American institutions—that self?

We're getting into questions now that I can't answer short of writing a novel. To talk about it in an interview wouldn't work. It would just be confessional. I think the change that took place around '53, '54, '55 was so drastic and so thoroughgoing that we'd really have to pursue it to all the roots I have. Not only the biographical roots, but even, if you will, the karmic roots. I'm a great believer in karma. I do believe that we're not here just one time, and I don't have any highly organized theology behind that—it's just a passing conviction that keeps returning. Karma tends to make more sense than a world conceived without it, because when you think of the incredible elaborations that go into any one human being, it does seem wasteful of the cosmos to send us out just once to learn all those things, and then molder forever in the weeds. It doesn't make as much sense as the idea that we are part of some continual process that uses us over and over again, and indeed uses the universe over and over again. There is some sort of divine collaboration going on. So in that sense, since I believe in it and for me it's psychologically true, it's hard to give an explanation. But if I were to give one, the roots are also karmic. These are arguments that can't be accounted for by one life.

Hollywood must have made a pretty big impact, because you were writing *Barbary Shore* [1951] there and later *The Deer Park* [1955], and in those books your political vision seems to change. What was it about Hollywood?

Well, it wasn't Hollywood as such. I'm not one of the champions of Los Angeles. It's not a place I'd enjoy living that much. I suppose there are two recurring subjects in my life that just fascinate me over and over again. One of them is what we've already discussed, the establishment. The other is identity. And movies fascinate me inordinately because the question of identity is so vivid in them. Movie stars fascinate me. Their lives are so unlike anyone else's. You could almost postulate they come from another planet. The way of life of the movie star speaks of another order of existence. The lack of connection between a movie star's life and our lives is greater than the points of view we have in common.

Does that work into *The Deer Park* at all?

In *The Deer Park* I'm just beginning to contemplate the problem. Think of the character Lulu Meyers, the movie star. She's my first attempt to deal with that question. Of course I go at it hammer and tongs with Marilyn Monroe. But my Egyptian novel [*Ancient Evenings*] is also a study of identity. You see, I think there have been periods in history when no one has contemplated the problem of identity. Because we weren't necessarily far enough removed from the animals. We reacted to things that impinged upon us in the way a beast does. We fled, we attacked, we ate, we went to sleep. I think generations went by of that sort—and then there were periods when no question was more critical to anyone alive. Certainly in my early years at Harvard the question of my identity was paramount. The most interesting question to many of us in those days was, what do you really think of me.

Speaking of identity—do you think your notorious publicity has hurt the public or critical acceptance of your work?

Well, it certainly hasn't done it any good....I do believe that when people buy a hardcover book these days, to a slight extent it's a sacramental act. Very often the price of the book is such that people are making a choice between that or getting something else. To be crude about it, between the book or getting the baby a pair of new shoes. So you have to respect the author. If the author is somehow unsavory, then they may not buy your book. And there's a crude notion that if you get a lot of publicity, you sell books. Nothing could be more untrue. The authors who sell well, that is the good authors who sell well, get very little personal publicity. We don't read much about Saul Bellow, John Updike. We didn't use to read much about John Cheever....But my image can't be changed. So I've just said the hell with it. I'll go ahead and do what I want to do.

Let's talk about artistic identity. I see an apparent change toward more self-effacement in your writing, in narrative technique, in the last five years. Do you see a new maturity in your writing?

Maturity comes of its own accord. You don't ever say to yourself, well, now I'm going to be more mature. You get older, so your point of view shifts and compromise takes on more luster. A fixed point of view begins to seem harsh. The result is a greater maturity in the writing. But I may well go back to writing in the first person. I don't have any feeling about it as such. I just don't like to be bored when I'm writing. I often think by now I have much in common with a dentist who's been working for 40 years. I'm sure he looks for a new way to make a hole in a tooth. Because otherwise he'd go mad.

It's interesting that the two books that you got the Pulitzer for, *Armies* and *Executioner's Song*, are two extremes—the presentation of the self on the one hand, and the reduction of self on the other. So the reaction has been positive to either side of your artistic identity.

Well, I think they are also two of the best books I've written. If I had five favorite books those would be two of them. I don't think there was any larger point of view in the choice of those two. I think it just happened that *Armies of the Night* was a pretty good book, and it came along in a year when let's say the Pulitzer committee was sympathetic to that sort of book. The *Executioner's Song*, in its period, probably, well...that sentence concludes itself.

Do you see any young writers coming up that you admire? Any who might take the place you've talked about so many times, and may be at one time tried to fill yourself, as "the champ"?

I have a confession to make. In the course of not reading enough in the last 20 years, I've not read the young writers. I've read them hardly at all. I remember when I came along, I thought, oh boy, now I'll be able to talk to

Hemingway, Dos Passos, Farrell, all the writers I care about. They'll read my book and we'll be able to talk about it. My dreams will be realized. But I never met Dos Passos or Hemingway. I met Farrell once for lunch. I never met J.P. Marquand or Steinbeck. I sent Hemingway *The Deer Park* but it came back marked "Addressee unknown." I always felt he gave it to somebody at the post office to stamp it that way and send it back. It seemed to me that would be his sense of humor. At any rate I corresponded with Hemingway 10 years after *The Naked and the Dead* came out.

At the time I was shocked that older authors didn't read younger authors. And I didn't understand it. I was furious. And I'm sure young authors feel that way now. You know—why doesn't Mailer read me? I grew up reading him and he influenced me in part and he owes it to me to read me. Why doesn't he? The reason is simple. I know now why they weren't reading me, and I know that because I don't read the young authors. One gets locked into one's own continuing concerns. I haven't used any prizefighting images up till now, so I guess I had better use one. Whether you're fighting for the championship or not, you're fighting a 15-round fight. And by the time you reach your 60's, you feel as if you're in the 12th round and you're battered. I don't say this self-pityingly—you're just not as good as you used to be in an awful lot of ways... And your powers to protect yourself from distraction are much smaller.

I've seen young writers that I think are good, some are damn good, and there seems to be more and more felicity all the time. Each year there seem to be more people who can really write stunning prose And technique gets more and more elaborated. But I can't think offhand of any young writers who are philosophically disturbing at this point.

Czeslaw Milosz, in *Bells of Winter*, writers about poetic inspiration as if the poet were a living room with its doors wide open, visitors come and go—all he can hope for is that the visitors are forces of good rather than evil.

It may be that part of remaining a writer is to learn how to expose yourself less and less over the years and ring yourself around more and more with various protections. The price of that, of course, is that inspiration enters the door much less often. But at the same time you can carry out your projects. It seems to me that if there is any lesson I can draw from my working, it is that it has taken me close to 40 years to learn how to write long books. *The Naked and the Dead* came early and that was to a certain extent a gift. I was a simple young man and I didn't understand the difficulties. If I had known the difficulties I wouldn't have gotten into it. It would have taken me 10 years.

You said in 1981 that things are sinister but not in the way you used to think they were sinister. What did you mean by that?

In the '60s I had a sort of paranoid vision of the invisible government. Now I suppose it has moved over to the idea that such things as television and plastics are probably doing us much harm, and getting us much closer to totalitarianism than the FBI or the CIA ever would.

What's the force behind that?

Well, there you get into dreamland, don't you? I sometimes think that there is a malign force loose in the universe that is the social equivalent of cancer, and it's plastic. It infiltrates everything. It's metastasis. It gets into every single pore of productive life. I mean there won't be anything that isn't made of plastic before long. They'll be paving the roads with plastic before they're done.

On the one hand we, all of us, consciously or unconsciously, contain an adoration of the universe. We also have this great animus toward the universe. It's larger than we are and that's intolerable to us. The ego, or the 20th-century manifestation of it, flames up in us. We have to do something to that universe. We have to *score* it. We have to literally score on it, and plastic is a wonderful way to do that because we create something that the universe can't digest. We literally make these carbon chains, these protein chains, that are put together in a way that they just won't break down—"nonbiodegradable"—that marvelous little new word.

So that's one thing. And of course television is another. It's as if a great dragon called entropy has come into esthetics. And television is the final reduction of all art into 15-minute slugs of pap.

Robert Frost once said there was something immodest in a man who believes that he is about to go down—or that we are about to go down—before the worst forces ever marshaled against us in the universe. In your work the point seems to be that we may very well be going down before just such forces.

Well, I never said that Robert Frost was going to approve of me.

But do you think we may be at such a crisis?

I don't think I'm the only one who thinks that. An awful lot of people are worried....The world is now going through an apocalyptic time—I think the '80s are going to be an incredible decade, with more surrealistic, fantastic change even than in the '60s.

Let's turn to the work you've been doing recently—your Egyptian novel, *Ancient Evenings*. Do you feel good about the completed work at this point? You announced the book as early as '72, in *Existential Errands*, so it's been a long, probably difficult road.

If I say I feel good about it, it's like saying my child is wonderful. It's not seemly. I will say it's the most ambitious book I ever worked on. It's by far the most unusual work I've done, and it's out of category. I can't think of any other novel that's remotely like it....My hope is that it's very good indeed. But how good I don't have a clue. I think when it comes out, it will be the usual story. I hope it will get some wonderful reviews, and I'm certain it will get some terrible reviews.

If I were an unknown author, the book could be read a little more easily. But the trouble is everybody is going to be reading it and saying, "How the devil does Norman Mailer get himself up to start writing about Egyptian pharaohs? I mean that's really going too far." But it has nothing to do with the fact that that's my name. I'm an author. I have a right to imagine a work, and to write a work of the imagination. If I had any name but my own, people could read the book without too much suffering.

If it is indeed good in the artistic sense, maybe it would not have been published. It's not a blockbuster, a best seller sort of book.

I certainly think it's good enough that no matter who had written it, it would have been published. And I think it's good enough that no matter who had written it, it would have received attention. Because if you spend 10 years writing a book it should be good.

There were a lot of expectations—and at times earlier on you seemed to feed those expectations—that this would be your masterpiece. If that was ever a goal, did the process of writing the book change the goal?

Well, it deepened. It started as an excursion into Egypt. I was going to dip into Egypt for a chapter or two, then get out, move on to Greece and Rome, then the Middle Ages. I was thinking of sort of a picaresque novel. That was in the first half year of working on it. But I began to realize that I was in Egypt for a long haul. So I started studying, and I've learned about ancient Egypt these 10 years.

Was there any fear of the risk? You've used the word risk yourself several times.

Well, there is always fear in a writing a book. If I had tried to write the book in a year, the fear would have been so great it couldn't have been written. But over 10 years, you can carry the fear. Writing a book is the fear. That's why there are many more people who can write well than people who do.

And there are other reasons for it. Some people can't take the meanness of the occupation. There's nothing very attractive about going into a room by yourself every day and looking at a piece of paper and making scratch marks on it. Doing that day after day, year after year, decade after decade, is punishing through the very monotony of the physical process.... Just the act of writing as a physical act is less interesting than painting. I never feel sorry for painters. I feel sorry for writers.

Writing is like all occupations that have some real element of risk. In the case of a writer the risk is to his ego. You really don't want to write a book in which you're not taking some risk.... And I will say I've taken more risks with the Egyptian novel than any book I've ever written. It's the most, dare I say it, audacious of the books I've done.

You've said that all we can ever know is whether we have worked as hard as we can. Do you believe you've done that on this book?

Yes. I think I've used up every bit of inspiration I've had on this book. If the book is not good enough, then I'm not good enough. I feel that kind of peace about it.

Did it take you places you have never been before? Creating new ideas?

Yes. It also gave me an understanding of certain things. I think people are going to be immensely confused by the book. They are going to say, why did Mailer write it? What is he saying that means something to him? The man we know. What is in this?

Well, I think I've come to an understanding of the wealthy I've never had before, dealing with Egypt, its gold and its pharaohs....There's that marvelous remark of Fitzgerald's that the rich are not like you and me, and Hemingway's answer, which was much applauded but which I've always thought churlish, you know, yeah, they have more money, and everybody roars like crazy. The fact of the matter is Fitzgerald was trying to say something, and Hemingway was trying to keep him from saying it. The very rich are not like you and me, Just as movie stars are not like you and me. In fact the very rich and movie stars have much in common. They no longer have a trustworthy relation to the society around them. In the most umbilical sense, they can't trust anyone.

That's a good partial answer to my next question. Why Egypt? Because it represents a turning point from primitive dread, from magic, toward technology and the abuses of technology?

I don't know enough about history to be able to answer that. Egypt was one of the places—I think it was definitely one of the places where magic was being converted into social equivalence, in effect used as an exchange.

That's what interested you, at least in part?

What interested me was that I made one assumption that certain people will argue with and others will find natural. The assumption is that the Egyptians had minds that are easily as complex and interesting as our minds. They had an intellectual discipline that was highly unscientific from our point of view. But I suspect no farther off the mark than ours. Now these are assumptions. So the book has an immense preoccupation with magic as such. I tend to end up writing the best novel on subjects no other good writer has ever written about. I can name a number of subjects that I've written the best work on, where there's no competition, subjects that no other writer would tackle. For instance, I'd say I've written the best biography of a movie star that's ever been written—*Marilyn*. Again there's no competition. I've written the best book about a heavyweight prizefighter that's ever been written—*The Fight*. Again, no competition. Now I think I've written the best novel about magic that's ever been written. But where are the others who have been writing about it? I don't know of a serious writer who's devoted himself to writing about magic. People have written magical novels, but they are not writers who are highly regarded. But I will say once again, that I've taken a field—I'm a bully—where there's no competition.

Do you think that these people whom you are writing about had a sense of what God's will was?

One has to keep reminding oneself that this is before the Judeo-Christian era. We're dealing with pagans. The pagan mind is fascinating, but I found while I was writing the book that when I went through it, I had to keep making certain that there wasn't a single Judeo-Christian idea in it. Actually I think the Egyptians had a tremendous influence over the Hebrews. Much of the Old Testament you find in Egyptian prayers. Some of it's startling. The early pages of Genesis, the first page of Genesis could be taken from certain prayers to Ammon and the ways in which he created the universe.

Is it safe to look at Hebrew culture as a competing minor culture at the time?

It wasn't even quite a minor culture at the time. They were still a race of tribes and barbarians. They weren't taken seriously. Not at this period. Later they were. This is 1100 B.C. In fact, Moses appears in my book for about a page. He's seen as some sort of minor guerrilla who kills some Egyptian guards, and takes the Hebrews to a certain town with him across the desert to escape. The idea is to immerse yourself in another point of view when you are writing. Because when you do a lot of things come to you.

You said you wished nothing in the book to be contemporary. In what sense is there a connection between ancient Egypt and today? In other words, what's in it for modern readers?

Well, I've failed if we start reading the book that way. And I think that's going to be one of the difficulties for people, because most historical novels perform a service or pretend to teach us something about today. And I will have failed if that's the way people react to my book.

I want people to realize, my God, there are wholly different points of view that can be as interesting as our own. And as thoroughgoing as our own. In other words, probably a social evening in Egypt—and this is one of the reasons I ended up calling the book *Ancient Evenings*—in that period 3000 years ago was as interesting as an evening in New York today. Not more interesting, necessarily, but as interesting...for altogether different reasons.

Not much happens in the sense of action, I believe you've said, in the sense of a typical wide-canvas, panoramic, historical novel.

Well, no, a lot does happen, but it doesn't happen immediately. The book certainly has the most complete architecture of any book I've written. It's in seven parts. Each of its parts, I would say, has a separate existence. The book continues from part to part, most definitely. But the nature of the book discloses itself part by part. When you've read part one and part two, you won't have any clue at all what part six and seven are going to be like. It's as if the book moves in a spiral.

You've said you're planning a trilogy. Will the other books be 10-year projects?

My hope is to do the next two books in three or four years each. If they each take 10 years, I'd be celebrating my 80th birthday.

My last question—people criticize you for presenting your existence, your life, your work, in a way that seems you want other people to believe as you do or be like you or live like you. How do you respond to that criticism?

I think I'm truly misunderstood there. I'm right and I'm wrong so often, so many times of the day, that I have no interest in having people think the way I think. What I'm interested in is that however people think they get better at it. That's what's important about one's work. In the work of good authors, if a book is good enough, you cannot predict how people are going to react to it. You shouldn't be able to. If it's good enough, it means it's not manipulative.

In a certain sense one's ideas are expendable. If the best of my ideas succeed in changing the mind of someone who's more intelligent than myself, then that's fine. I'm a great believer in the idea that if you advance an idea as far as you can and it's overtaken by someone who argues the opposite of you, in effect you've improved your enemy's mind. Then someone will come along on your side who will take your enemy's improvement of your idea and convert it back again. I'm nothing if I'm not a believer in the dialectic. And to that extent one does the best one can. □

An Excerpt from 'Ancient Evenings'

By NORMAN MAILER

HE was dressed like a High Priest and for all I knew he was a High Priest. His head was shaved and he seemed to inhabit the air of his own presence, as if each morning his body was sanctified. Yet he looked like no High Priest I had ever seen. He was too dirty and very old. Ashen was the color of his white linen robes and the dust of years had beaten into the cloth. Ashen was the color of his skin, even darker than his garments, but rubbed in the same dust, and the toes of his bare feet looked like fingers of stone. His bracelets had turned to shades of green. The corrosion of his anklets was black. Only his eyes were bright. His pupils were as expressionless as the painted look of a fish or a snake, but the whites were like limestone in the light of the moon. By the light of my torch, it was only the white of his eyes that enabled me to be certain he was not a statue, for he remained motionless on a chair beside his coffin, and could have passed in age for a hundred years old, a thousand years old, if not for the fierce light of those eyes.

I felt a return of the oppression I knew when looking at his coffin. He was so old! One could not even describe his features for lack of knowing where the nose reached the flesh of the cheeks. Just that wrinkled were the terraces of his skin. He seemed close to lacking existence altogether, yet made me so uneasy by his presence, that I thought to rid myself of him. Quickly. As if he were some noxious insect. So I took a step to the Canopic jar nearest to his coffin—it was Tuamutef—and twisted its lid. The top came off easily. The jar was empty. No wrapping of the heart and lungs was in the vase of the jackal. I turned to Amset. Also empty.

"I have eaten them," said Menenhetet One.

Had the thin air of his throat not been warmed by the sun since the day he died? The echo of a cold cavern was in his voice.

"Why," I was about to ask, "why, great-grandfather, have you eaten your own blessing?" but the impertinence of the question was pulled from my mouth before I could ask it. I had never known such an experience. It was as if a rude hand reached into my throat deep enough for me to gag, seized my tongue, and shucked it from the root to the tip.

It was then I felt a fear clear as the finest moments of my mind. For I was dead, so I understood once more (again as if for the first time) and being dead, might now be obliged to meet every terror I had fled while living. Of these terrors could it be said that my ancestor, Menenhetet, might prove the first? For I could certainly recall how often we talked of him in my family and always as a man of unspeakable strength and sinister habits.

Now, as I stared at him, he spoke. "What," he asked, "are your sentiments?"

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"My sentiments?"

"Now that we are together."

"I hope," I said, "that we will begin to know each other."

"At last."

The same keen air was in my lungs that I had known in the tomb of Khufu. The best of myself must have come back to me for I felt the curious exhilaration, even the certainty, that I was meeting my enemy. Was I meeting the enemy of my life—now that I was dead? But speak not of death. It was without meaning to me. I had never felt more vital. It was as if I had decided on some terrible day to make an end of myself and I had walked to the edge of a cliff, looked down into the gorge, knew I would certainly step into the space before me and in one fall be dead. At such a moment I might know fear in every drop of my blood, yet the future would feel as alive as lightning. Just now I had that sense. It was the happiness of being next to my fear, yet separate from it, so that I could be free at last to know all the ways I had failed to live my life, all the boredom I had swallowed, and each foul sentiment of wasted flesh. It was as if I had spent my days beneath a curse, and the sign of it—despite every lively pandemonium of gambling and debauch—was the state of immutable monotony that dwelt in my heart. The sense of being dead while alive—from what could it have come but a curse? I had an inkling then of the force of the desire to die when that is the only way to encounter one's demon. No wonder I stood before him in an apprehension as invigorating as the iciest water of a well. For on how many lovely evenings in how many lovely gardens had I told funny stories about the filthy habits of the first holder of my name? How we cried with laughter at tales of his calculation, his cunning, his sacrilegious feasts of bat dung.

But now, as if he had heard my thought, he stood up for the first time, not a big man nor so small as he had first appeared, and dusty as the loneliest roads of the desert.

"Those stories," he murmured, "left my name repulsive," and by the air of self-possession with which he said this, I began to wonder whether I was most certainly his moral superior. That he was the guide to my final destruction, I did not cease to believe, but that he might also have a high purpose now occurred to me. If, in these curious intoxications of knowing I was dead, I had begun to feel as splendid as a hero, still I could not remember my heroism. Nonetheless, I had hardly doubted that my purposes (if I could ever find them) would be noble. Now, I was not as confident.

"Do you think," he asked, "I am handsome? Or ugly?"

"Are you not too old to be either?"

"It is the only answer." He laughed. In mockery of me, his finger idled from side to side. "Well, you are dead," he said, "and certainly in danger of expiring a second time. Then you will be gone forever. Goodbye, sweet lad. Your face was more beautiful than your heart." Abruptly, he gave an old man's snigger, unspeakably lewd. "Are you content to let me be your guide in Khert-Neter?" he asked.

"Do I have a choice?"

□

"Tell me of Khert-Neter," I said in a merry tone, as if asking for another drink.

The old ravaged face, wrinkled as the shell of a turtle who has walked through fire, now showed a High Priest's love of ceremony. "Strengthen my breath," he said in his cavernous voice.

A transformation came to him with these words, however. The dirt about his body began to look like silver dust, and his right arm was raised toward the heavens. His eyes stayed in solemn contemplation on the ground. Yet, next, he winked at me. I was shocked. He seemed to delight in flinging my thoughts about in all directions. "We need," he said, "to prepare you. After all, you have forgotten what you know. That is common to the Ka. It keeps a poor memory of our most sacred customs."

But his shifts gave me no time to recover my wit. Now he spoke in his ceremonious tones again. "O Lord Osiris," he began, and touched his forefingers to his thumbs as though to form two eyes: "I have passed over rivers of fire and through geysers of boiling water. I have entered the dark night of the Land of the Dead and gone through the seven halls and mansions of Sekhet-Aaru. I have learned the names of the Gods at the door to each hall. Hear of the difficulty of this beautiful young man whose Ka would accompany me. How can he obtain the patience to learn the names of the three guards at the door to each hall when his memory is infirm? Know the hazards. The Doorkeeper at the Fourth Hall is named Khesefherashtkheru, and the Herald who examines those who die in the night only replies to the sound of Neteqaherkhesefatu. And these are but two of the twenty-one names which the Ka of this boy must learn if he is to pass through the gates of Sekhet-Aaru." My great-grandfather paused, as if to contemplate those names. "Yes," he said in a voice of much resonance, "I, who am Osiris Menenhetet One, have survived Your judgment, Lord Osiris, so give ear to my prayer that You spare the Ka of this young man from such fires, for he is no other than the splendid Osiris Menenhetet Two, my great-grandson, son of my granddaughter, the Lady Hathfertiti, who was my concubine in life and kept in carnal knowledge of me through the years of my death, may the scorpions continue to serve me."

I was bewildered. The prayer was devout, yet not like any I knew, and I was much confused by the remarks he had just made about my mother.

"I could tell you more," he said. "I can say the prayers for repulsing the serpent and spearing the crocodile. I can give you the wings of a hawk so you may fly above your foes. Or show you how to drink the ale in the body of the God Ptah. I can reveal the gates to the Field of Reeds and teach you to come forth from the fishing net. Yes, I will do this if I am your guide."

I was drowsy before the need to sleep. That ancient subterranean voice invoked so many names. I might mock those names, but to call upon such a host in so short a time left me weak. Now I realized that the strength of my Ka seemed as short-lived as the confidence of a child to stay on its feet when first it learns to walk. I had an impulse to prostrate myself before him. □

Evaluative Journalism: A New Synthesis

By MICHAEL NELSON

American political journalism has changed over the years, following in turn several models, from the partisan reporting of the 19th century to the objective style used through much of the 20th century until the more recent personalized "New Journalism" and investigative reporting. Political scientist Michael Nelson traces these developments and describes how one promising new school—evaluative journalism—has "selectively borrowed" strengths from each preceding model. Nelson, an assistant professor at Vanderbilt University, is coeditor of *The Culture of Bureaucracy* and coauthor of the forthcoming *Presidents, Politics, and Policy.*

SOMEWHERE along the line, even those of us who are not deeply versed in Hegel probably have heard the popularized version of his theory that historical change is the product of clashes of ideas. "Thesis," the leading idea of an age, confronts "antithesis" and out of that comes "synthesis," a new idea that contains some elements of both and becomes the next era's thesis.

The model is chemical—mix blue paint and yellow paint and you get green paint. But one can also imagine a physical model for this process: two masses collide, then shatter, producing not synthesis but something else—"multithesis," perhaps.

It is not yet clear which of these models describes the changes that have taken place recently in American political journalism. It's clear which one seems to apply at the moment—the clash between the partisan journalism of the 19th century and the objective journalism that until recently has characterized the 20th has produced a variety of only partially satisfactory new forms, investigative reporting and the "New Journalism" chief among them. But the14-year experience of a magazine called *The Washington Monthly* offers hope that a new synthesis really is emerging: I call it "evaluative journalism."

"Thesis" manifested itself in the form of partisan journalism. The political press of the 19th century literally was conceived in partisanship: the capital's first newspaper, the *National Intelligencer,* was founded in 1800 because President-elect Thomas Jefferson suggested the idea to editor Samuel Harrison Smith. There was no question about the *Intelligencer* being the house organ of the Jeffersonian party or about the journal being rewarded for its loyalty with all the government's printing business. Nor was it any surprise that the change of parties that followed Andrew Jackson's election in 1828 produced a

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new paper (the *Globe*), edited by a member of Jackson's circle of unofficial advisors, which would start receiving what subsidies the government had to give.

Washington correspondents from newspapers around the country were as unabashedly partisan as the locals. As Bernard A. Weisberger points out in *Reporters for the Union*, a journalist might describe one senator as having "a fawning, sinister smile; a keen, snaky eye..." The speech of a senator who shared the same reporter's partisan views, however, was "full of marrow and grit, and enunciated with a courage which did one's heart good to hear."

Partisan journalism survived until the end of the 19th century. Usually its purpose was to win full support for a political party and its candidates, but sometimes it tried to direct public opinion in support—or even creation—of a special cause, as William Randolph Hearst's *New York Journal* did with the Spanish-American War. Sometimes, too, the partisan press seemed to whoop up enthusiasm for its own sake. One can flip through story after story about "The Coming Crisis" in some 19th-century newspapers without finding the barest description of what the crisis was.

In the later 1800s, two forces, both related to the rise of a national economy, militated for change in the partisan journalism ethic—for an antithesis, if you will. First, a large class of readers developed who were educated and interested in happenings around the country. They provided a constituency for accounts of political news that did not try to make their minds up for them. Second, the wire services, which were serving more and more papers in every part of the nation, decided that partisanship was bad business: in the course of pleasing one party's newspapers, they would displease not only the other's, but also those readers who wanted their news unleavened with overt political bias.

A new, "objective" model for journalism was the response to these developments. No paper embodies it better than *The New York Times*. When Adolph Ochs bought the *Times* in 1896, its circulation was 9,000. Yet, writes David Halberstam in *The Powers That Be,* Ochs "wanted as little partisanship as possible...he wanted to make as few judgments as possible." Even as Hearst's *Journal* and Joseph Pulitzer's *New York World* gained renown by fanning the flames of war in 1898, the *Times's* more subdued appeal to educated readers raised its circulation to 82,000 by 1900. Soon it became the standard by which all American newspapers were to be judged.

The ethic of objective journalism could be stated simply: it was the business of the press to report the news, not make or evaluate it. Reporters and editors were to check their personal opinions and judgments at the newsroom door and report neutrally, with an emphasis on such qualities as providing balance and getting the facts straight. The subject of objective journalism's political attention was the sayings and doings of public officials. The kind of stories it typically produced were long summaries of congressional debates, with quotes from both sides of the issue, and presidential campaign dispatches that told readers what the candidate said, the weather and the size of the crowd, the latter based on the police chief's official estimate.

Objective journalism was a useful corrective to the partisan press, and it still is what most readers want most of the time. But over the years, its limits as a way of telling the public what it needs to know about politics and government have become evident.

The major problem with confining journalists to neutral and nonjudgmental reporting on the words and actions of public officials became clear when Senator Joseph McCarthy began his campaign against the imagined Communists in the State Department in 1950. In this case, Douglass Cater observed in *The Fourth Branch of Government:*

> The extent of the communications failure McCarthyism presented can be measured by the fact that few of the reporters who regularly covered McCarthy believed him. Most came to hate and fear him as a cynical liar who was willing to wreak untold havoc to satisfy his own power drive. But though they feared him, it was not intimidation that caused the press to serve as the instrument for McCarthy's rise. Rather it was the inherent vulnerabilities—the frozen patterns of the press—which McCarthy discovered and played upon with unerring skill. "Straight" news, the absolute commandment of most mass media journalism, had become a strait jacket to crush the initiative and the independence of the reporter.

One limit on truth produced by the norms of objective journalism grows out of its stimulus—response character. If the rules require that stories be written on a subject only after a public official speaks or takes action, the news media have ceded much control over the definition of news to those who are its objects. An incident in Peter Maas's biography of New York City policeman Frank Serpico illustrates the problem. David Burnham, a reporter for the *Times*, wrote a story about police corruption in February 1970 based on what he had learned from Officer Serpico and others. The editors sat on it—Serpico was not a public official, and if they ran the story, they feared, it might seem as if they were making, not reporting the news. As it happened, Burnham met Mayor John Lindsay's press secretary at a party in April 1970 and told him what he had learned about the police department. Two days later, Lindsay announced an official investigation. Given their stimulus—a public official had acted—the *Times* responded by running Burnham's story the next day.

This example draws attention to another of objective journalism's big problems: its definition of political news as the province of high public officials. One effect of this definition is to narrow the field of newsmakers artificially. It includes the congressmen, Presidents and cabinet members who articulate policies and pass legislation, but not the middle-level bureaucrats who actually carry them out.

Most of the remaining problems with objective journalism have to do with its effect on objective journalists. The public officials they deal with are experts in the art of public relations—the survival-of-the-fittest nature of the world of politics guarantees that. Reporters, though equally talented, are hamstrung by the constraints of their profession. Frustrated, they all too easily can get used to fashioning stories out of press releases and leaks from the people they cover. Such leaks, which often are used as rewards for the cooperative, may amount to nothing more than a one-day lead on the name of the new nominee for deputy undersecretary, but they give the reporter scoops that are likely to keep him in his editor's good graces.

More than anything else, Watergate brought home the limits of objective journalism. While White House aides plotted within 30 meters of the press room, reporters stayed busy writing up the day's presidential announcements or tagging along on the latest presidential trip. When Bob Woodward and Carl Bernstein, two police reporters, broke the story for *The Washington Post,* White House correspondents responded by asking the President's press secretary and other top aides for their reactions. Not a single Watergate story was uncovered by the White House press—they were too busy doing their jobs.

□

Hegel's synthesis, you will recall, contains some elements of both the old thesis and the new antithesis. So does the multithesis I described as another possible result of the collision of ideas.

Not surprisingly, then, the journalistic reaction to the discovered limits of objective journalism that Watergate so dramatized preserved some of the qualities of objective journalism yet also harkened back to some abandoned ones of the partisan press. One response, investigative journalism, restored the partisan school's preoccupation with scandal, but it preserved the objective concern for facts. A second response was the New Journalism, which usually is associated with writers such as Tom Wolfe and Hunter Thompson. Like their partisan predecessors, new journalists called for subjectivity in the form of the opinions of the writers. Like the objective reporters, they wanted facts, but they also wanted something else, feeling that facts and the truth are far from synonymous.

The investigative model is the mirror image of two qualities of objective journalism. If objective reporters looked at what officials said and did publicly, investigative journalists would look at what they said and did privately, at least so far as it concerned their official responsibilities. If objective reporting moved in response to official behavior, investigative journalism would be the stimulus—investigators would go after stories, not wait for them.

The triumphs of investigative journalism are legendary and legion. But, like its forebears, the investigative model has limits as a way of telling readers what they need to know about the political system. First among them is the emphasis on scandal. Not only is scandal not typical of government; it is not typical of the problems of government.

If the emphasis on scandal is misplaced, it also is often misapplied. The rush to uncover wrongdoing through investigative reporting seems to have left undone the defining of what wrongdoing is. A frequent error is to equate scandal with secrecy or with perceived conflict of interest.

Richard Nixon's resignation made 1974 a landmark year for investigative journalism. In a less spectacular way, the publication of Tom Wolfe's book on *The New Journalism* also signified 1974's importance for writers of that school, which had developed rapidly since its "birth" in *New York* magazine a decade earlier. The rationale for the new journalism is a complicated syllogism that runs as follows: reporting cannot be absolutely objective (true enough—as reporter/novelist John Hersey notes, "the minute a writer offers 999 out of 1,000 facts, the worm of bias has begun to wriggle"); even if you had them all, facts alone do not equal truth (accurate again—is there not truth in the parables?); fiction can lead us to truth (granted—the most revealing writings I have seen about Washington politics are the short stories of Ward Just); therefore, journalists should draw on some of the techniques of fiction. Wolfe cites four: scene-by-scene construction, dialogue, point of view and what he calls "status details." What all this adds up to is the glorification of subjectivity.

The injection of the writer's judgment into his reporting can be a desirable thing. But the new journalism has been for the most part a loose cannon. At its worst, it has distorted the obvious point that facts do not equal truth to mean that facts don't really matter. One reads page after page of dialogue that the writer did not overhear, thoughts that the writer puts into the heads of characters and descriptions of events the writer knows did not happen. Even the best new journalists feel that they have the right to violate what Hersey, in a recent *Yale Review* article, describes as the "one sacred rule of journalism: the writer must not invent. The legend on the license must read: None of This Is Made Up." By using the fiction writer's licence as well, the reporter blurs the distinction between fiction and journalism that readers rely upon to keep their bearings.

□

Just as each of the contemporary models of journalism has limits that need to be overcome if a journalistic synthesis is to develop, so does each have virtues that need to be preserved. In the third paragraph of this essay I mentioned a magazine called *The Washington Monthly* that I think has taken us close to the "evaluative journalism" ideal, in theory if not always in accomplishment. Some background on the *Monthly,* whose relatively small circulation has left it unknown to most people, may be helpful.

The Washington Monthly started publishing in 1969, but its roots can be traced to the Peace Corps Office of Evaluation that Charles Peters founded in 1961. Peters, then a 34-year-old West Virginia lawyer-politician, had earned his position by backing Senator John F. Kennedy's presidential candidacy early and vigorously. His job was particularly important to the fledgling Peace Corps because, as reporter Richard Rovere noted, "precedents [for the agency's activities] were few and for the most part irrelevant." Peters's approach was to "put together a staff of full-time evaluators, some of them experienced journalists, and dispatch them to various parts on the globe to cast a cold eye on what they saw and report back to Washington."

Though Peters stayed with the Peace Corps into the Johnson Administration, he also began developing plans for a new magazine that would apply his office's technique to a broad range of American institutions. The force of his vision and personality enabled him to raise the necessary seed money from a variety of contributors. Peters was also able to attract good effort from well-known writers and scholars: the magazine's inaugural issues featured first-rate articles by Russell Baker, David Broder, Murray Kempton, Arthur Schlesinger Jr. and John Kenneth Galbraith, among others.

What distinguishes the *Monthly*, however, is not established writers plying their trade, but the young writers Peters has developed—James Fallows, Michael Kinsley, Tom Bethell, Taylor Branch and Nicholas Lemann, among them—and more important, the purpose to which he has put them. That purpose—evaluative journalism—is made up of several ingredients, most of them selectively borrowed from the other models. From objective journalism, Peters took the primacy of facts. Accuracy may not be a sufficient condition for good reporting, but it is a necessary one. Peters argues that journalists who move beyond the "stenographic" recording of information and offer analysis and opinion in their stories have, if anything, an even greater obligation to be accurate than objective reporters. It is hard to disagree—we demand more precision from an engineer who is digging a foundation for a building than we do from an engineer who is just digging a hole.

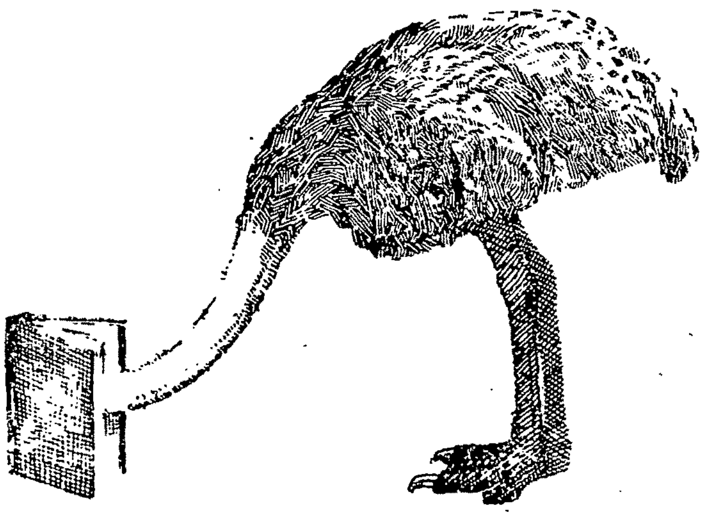
From the new journalists, Peters took the desire for reporter subjectivity: if someone has probed deeply into a subject, why shouldn't we be interested in learning at the end of the piece what he has concluded about it? To Peters, the usual segregation of fact, which goes in the news sections, and opinion, which is relegated to the editorial pages, simply gives us news stories untempered by judgment and editorials unsupported by journalistic research. The idea—not for every news story, of course, but for those that have been worked on for a period of time—is to hold reporters to high professional standards, turn them loose without preconception and allow their judgments to grow out of their research.

The third element in evaluative journalism is borrowed in part from investigative reporting's command to journalists to find out what lies behind the press releases. But even more important than going behind, is the need to go beyond—why, where, how often and what can be done about it. It is a preoccupation with the ordinary and unchanging, with the iceberg rather than the tip.

Most important among the U.S. political system's constants, Peters suggests, is the "culture" of its various institutional structures—"the customs and rituals and pressures that govern life in these institutions." For example, in May 1978, *The Washington Post* ran a front-page scandal story telling how one government agency spent money recklessly at the end of its fiscal year in order to use up all its appropriations for the year and avoid risking a budget cut because it hadn't spent all its money. Neither the author of the article nor the editor seemed to realize that the end-of-the-fiscal-year spending spree has been a government-wide practice for years.

Peters's evaluative journalism model has had good effects on the rest of the press. A week's reading of *The New York Times*, for example, will turn up a piece on internal bureaucratic rivalry between two public broadcasting organizations, an assessment of the value of standardized educational tests and a dozen similar studies. *The Washington Post* has recently begun daily coverage of the federal bureaucracy on a "Federal Report" page. Hundreds of newspapers pick up *Times* and *Post* stories; even the wire services are improving as a result of the competition. Editors at both papers give at least partial credit to Peters, and the Columbia University Journalism School has given him its highest award, previously bestowed on political commentators Walter Lippman and I.F. Stone, and *New Yorker* editor William Shawn, among others.

If the spread of the *Washington Monthly*-style *method* of evaluative journalism is cause for rejoicing, so is the continuing neglect by the press of the *substance* of that journalism—the day-to-day workings of the bureaucracy—cause for despair. In the course of my own research, I have found that the aspect of government that concerns citizens the most is not Presidents, elections, policy issues or the rest of the topics the press usually labels as "politics," but rather the bureaucracy, particularly the myriad specific government agencies they feel intruding into their daily lives, such as those that deal with taxes and social health and welfare. It is clear, then, that helping readers understand the bureaucracy that so conerns them will be good for the media to undertake. ☐



A CARTOONIST'S VIEW

By STEVEN HELLER

The reviewer is art director of *The New York Times Book Review* and editor of *Man Bites Man: Two Decades of Satiric Art.*

CAPTIONED cartoons are usually considered ephemeral, often more a literary adjunct than an art form, and certainly outside the perimeters of critical consideration. Most are drawn speedily on letter-sized bond paper in order to fit comfortably into the manila envelopes in which they are sent to and from prospective markets. Except for work by a few contemporary practitioners, these drawings are rarely appreciated for their artistic merits, and thus serious exhibitions of cartoonists' oeuvres are few and far between. This is why the retrospective work by *The New Yorker* cartoonist Edward Koren, at the Art Gallery of the State University of New York in Albany, is a glorious departure from the norm. It enhances the field of cartooning, but more importantly proves that Koren is not only an acute social satirist, but a significant artist as well.

The reaction a reader has to Koren's reproduced work in magazines and newspapers bears little resemblance to what one experiences when viewing the originals. For, in marked contrast to many of his colleagues, Koren produces his cartoons on a grand scale with intensity and passion. Regardless of their initial purpose, each drawing is more than a mere gag. His ubiquitous hirsute beings and fuzzy beasts are created on mammoth sheets of heavy stock with attention given to every random line. The verve with which these drawings are rendered is virtually lost when reduced to the lilliputian space he is afforded in print. In this exhibition, Koren's splendid craft, solid artistic roots, as well as his wonderfully dry sense of humor, are celebrated, thus opening a wider door to his very special talents.

Koren is unquestionably one of the most witty graphic commentators working today. He has an intelligent personal vision, marked by a sociologist's sensitivity to daily phenomena, and an uncanny ability to pinpoint and then transform the banality of living into strident, yet comic terms. Whether doing satire, children's book illustrations or playful doodles, his inherently funny line demands attention. Imparting his politically or socially motivated point of view is of paramount importance. His ability to achieve continuously surprising graphic results with a consistent (if not limiting) style is a key to his success as a cartoonist.

Cartooning is not Koren's only passion. He has had two previous oneman shows at a New York City gallery in which the work reflected his affinities with abstraction. The Albany exhibition includes a number of his nonrepresentational etchings, which depart from the familiar Koren style and rely on literary titles for their impact. These seemingly Klee-influenced prints are not as exciting or as innovative but serve to show a direct link between Koren's formal artistic pursuits and his comic drawings.

Also on view are a score of beguiling

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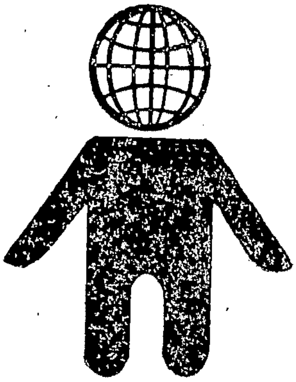
residents from his furry bestiary in the form of three-dimensional cutouts made of plywood, mounted and situated in strategic locations throughout the installation, as if on guard duty. These are doodles in wood imbued with the same attention to detail as his works on paper. Most intriguing are the personal, free-form drawings that reflect his current obsession with African costumes, masks and totems. In these, his familiar shaky line works wonderfully to evoke a sense of primitive mystery.

Koren's work is enigmatic. He is at the same time scabrous and loving in his critiques, or traditional and fresh with his freer work. Perhaps his oeuvre to date is most effectively summed up by a series of questions he asks himself in one of the best drawings in the show which reads: "Does it address the insanity of contemporary life? Are there subtle truths in the guise of fantasy? Is it a true examination of our social and cultural dilemmas? Is it exposing our innermost inconsistencies? Does it hold our foibles up to ridicule? Is it funny?" ☐



CANONS OF THE PAST

By STEPHEN MILLER

The reviewer is a resident fellow at the American Enterprise Institute.

Tradition. By Edward Shils.
University of Chicago Press. 334 pp.

TRADITION, as Edward Shils says in the preface to his new book, is a "bewildering subject." It can also be a deadly boring subject. One thinks of the solemn defenses of tradition heard at commencement exercises and other ceremonial occasions or the humorless attacks against tradition by those who preach the gospel of liberation. Edward Shils does defend tradition, but his defense is far from boring—mainly because he complicates the notion of tradition in ways that make his argument far more interesting than those of most staunch traditionalists.

The strenuous defense of tradition, Shils observes, is a modern phenomenon—the work of the counter-Enlightenment. Deploring the scientistic, rationalistic and individualistic strains of modern society, many of these writers looked back in nostalgia to preindustrial societies, which they assumed lived "in a condition of unbroken traditionality." Not so, Shils argues. Far from being locked into traditionality, such societies continually modified their traditions, since questions continually arose for which tradition had no answer.

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If traditional societies were not as wedded to tradition as their defenders have suggested, modern societies are far from being completely devoid of traditional elements. All relatively complex societies are shot through with different traditions. "The body of traditions prevailing in a differentiated society," Shils says, "is a very heterogeneous thing." Not only are societies permeated by different traditions, but so too are individuals; one can be a biophysicist as well as, say, a devout Roman Catholic. As Shils nicely puts it, we are all—whether we realize it or not—in the grip of the past, all creatures of tradition.

But how can that be, bearing in mind that many regard themselves as resolutely opposed to tradition, which they equate with oppression, ignorance and superstition? Shils argues that some patterns of thought strongly opposed to what he calls substantive tradition are themselves traditions; there is a scientific tradition, a Marxist tradition, a progressivistic tradition. When someone chooses to embrace one of these he enters into "an already charted territory with its own already established rules, demands and exigencies."

Shil's notion of antitraditional traditions enables him to question those who make absolute distinctions between scientific and humanistic forms of inquiry. Like the humanist, the scientist never begins from the beginning, since no new knowledge is possible without a grounding in old knowledge. All traditions of inquiry —scientific, humanistic, religious— begin with a study of old knowledge, that is, with a study of the tradition.

Does Shils make too much of the notion of tradition, asking it to do too much explanatory work? At times I find his distinctions somewhat unclear, but generally his approach is appropriate. By dwelling on what we might call the varieties of traditional experience, Shils highlights the absurdity of assuming that we can escape totally from tradition. "Where could the totally new come from?" he asks. "In fact, no imagination is so free as to be able to contrive something wholly new, comprehensive and detailed." Everyone, not only those who engage in scholarly inquiry, must rely on tradition. "Most human beings do not have enough imagination to think up an alternative to what is given; nor do they feel an urgent need to think up something new when there is already a pattern at hand." At the very least, tradition is a convenience, something the individual can fall back upon because the idea of continually inventing new ways of doing—or thinking about—things is a terrible burden.

"Not everyone in society wishes to live according to the emancipatory ideal," Shils says. I would put it another way. Very few people are strongly opposed to traditional ways of doing things. Shils, in fact, exaggerates the extent to which writers of the past 200 years have subscribed to a tradition of genius whereby the author feels compelled to "do what has not been done before by others..." No significant writer of the last 200 years has been so antitraditional. Rather, many writers have argued against the dominance of a particular canon of literature—a canon that included Alexander Pope yet left out William Blake. Shils himself acknowledges his debt to T.S. Eliot's writings on tradition, yet Eliot attempted to revise dramatically the traditional canon of English literature.

If Shils makes too much of the anti-traditional animus of the tradition of literary creation, this is nonetheless a minor flaw in a book whose importance cannot be overestimated. For its argument goes against the grain of modern social thought, especially modern sociology. Shils strongly questions the views of a seminal modern thinker whom Shils himself did much to introduce to the American scholarly public: Max Weber. According to Shils, Weber was wrong to assume that traditional beliefs and patterns of thought could not resist the corrosive power of rationalization. Traditional patterns of thought and feeling have much more staying power than Weber realized; they are continually modified but rarely do they disappear. Those political leaders and intellectuals engaged in a promethean project to bring constant modernization to their countries, Shils says, have been sorely disappointed, unable to "reconcile themselves to the obduracy of the human beings whom they would treat as malleable materials."

But if modernization generally has been unsuccessful, aggravating disorder in nearly every country, the fact that people rarely abandon traditional patterns of thought ought to be good news for the human race. Orwell, it seems, was much too pessimistic in *1984.* Traditions, especially religious traditions, are alive and well: "Although substantive traditions have been shaken, they have not been obliterated."

Which, for the most part, is a good thing. I say "for the most part" because, as Shils himself makes clear, it would be foolish to endorse the traditionalist point of view totally. "The tradition of emancipation from traditions is also among the precious achievements of our civilization." Traditions always need to be modified and sometimes need to be overthrown, but Shils is certainly right when he says that "a mistake of great historical significance has been made in modern times in the construction of a doctrine which treated traditions as the detritus of the forward movement of society." ☐

TRAGEDY FROM THE DAILY ROUTINE

By ROBERT BRUSTEIN

The reviewer, theater critic for *The New Republic,* is the artistic director of the American Repertory Theatre in Cambridge, Massachusetts.

EVER since I first read Marsha Norman's *'night, Mother,* it has filled me with the kind of exaltation I experience only in the presence of a major dramatic work, and how many new plays can you say that about in the course of a reviewing career?

The play, which won the 1983 Pulitzer Prize for drama, occupies about 85 minutes of stage time without intermission, as measured by three or four clocks that tick away remorselessly on the surfaces of the set. Scrupulously realistic, *'night, Mother* is also chastely classical in its observance of the unities, especially the unity of time. However, it not only measures its own time, but also the time of the

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audience. Matinees excepted, the clocks on stage display the same hour as the watches on the wrists of the spectators. This sounds like a gimmick, but it gives the play the density and compression of an explosive device, and accounts in part for its remorseless power.

The clock collection belongs to Thelma Cates, the aging mother of Jessie Cates; the two have been living together in a tackily decorated country house somewhere in the American South. In the brief course of the play, these two women will share a profound crisis, a catalytic experience designed to reorder the chemistry of a familiar relationship, and expose both character and destiny. The crisis is initiated by Jessie. Having retrieved her dead father's rusty revolver from a shoe box in the attic, she announces calmly to her mother that she has decided that very night to use it on herself.

At first Thelma is disbelieving, but Jessie's determination is unmistakable: the play is actually an extended death scene, preceding an inevitable, inexorable act. Jessie says she has informed her mother of her suicide plans in order to prepare her, both emotionally and domestically, for life without her. But even as she is outlining the shopping routine and inventorying the kitchen utensils (*'night, Mother* is a minutely detailed mosaic of the commonplaces of everyday modern life), Jessie is also trying to justify and explain the root causes of her extreme decision. Her passion for the quiet and darkness of death is fed by real misfortunes—her husband has left her, her son is a petty thief—but more incurably by a free-floating despair: "I'm just not having a very good time and I don't have any reason to think it'll get anything but worse. I'm tired. I'm hurt. I'm sad. I feel used."

Having made her decision, Jessie wants to use her last moments to explore her relationship with her mother and recall their past. She is full of recrimination, particularly about Thelma's failure to inform her fully about her epileptic condition, but underneath the bitterness and complaint lies a curious form of symbiotic love. Her suicide is perhaps meant partly to punish her mother, but it is also a means of reaching out to her, and in the agony of their parting there develops a deeper understanding between the two women than they could ever have achieved in life. But it is not enough. Jessie feels like someone who just failed to arrive. She waited and waited to fulfill the promise of her childhood, but it never happened; "I'm what was worth waiting for and I didn't make it. Me...who might have made a difference to me...I'm not going to show up, so there's no reason to stay, except to keep you company, and that's...not reason enough because I'm...not very good company...Am I?" To which Thelma must truthfully answer no.

But Thelma is not simply trying to understand her daughter's suicide, she is also trying to stop it, and she uses all the strategies and arguments in her possession to stay the course of necessity. Thelma is a salty, shrewd, good-natured country woman who represents a strong force for survival. Having allowed her damaged daughter to take care of her in order to give her a purpose, she is now being brought to realize that nobody can organize or possess another's life; but she still thinks she can prevent another's death. In an incessant stream of chatter, she tries to distract Jessie's attention with jokes and anecdotes, resorting then to tantrums, exhortation, derision, pitiful pleas, even physical threats. Nothing works for her—not even her poignant effort to prepare hot chocolate "the old way." Wondering what might keep her alive, Jessie muses: "If there was something I really liked, like maybe if I really liked rice pudding or cornbread for breakfast or something, that might be enough," to which Thelma replies softly, "Rice pudding is good." "Not to me," answers Jessie.

In the climax of the play, Thelma's positive force finds expression in a resounding affirmation of life, as she screams her own refusal to die. But it is not enough to counteract Jessie's pitiless and terrifying No. Realizing Jessie is already dead—"I'm looking right through you. I can't stop you because you're already gone"—Thelma crumples into helpless resignation, weakly absorbing her daughter's instructions about how to behave after she hears the shot. And when, following Thelma's final desperate attempt to restrain her daughter, Jessie says goodnight, closes her door and fulfills her destiny, Mama is left forlorn on stage, her left hand gripping the hot chocolate pan, as she picks up the phone to inform the rest of the family and confront the wreckage of her life.

It is a moment that must happen; yet we continue to believe that it won't, as in the highest tragedy. *'night, Mother* proceeds with the relentless force of a juggernaut, displaying not a single moment of artifice or contrivance or self-consciousness. In the absolute truthfulness of her treatment and dialogue, in the unforced poetry of her modern speech and in her capacity to create major climaxes out of petty quotidian affairs, Norman has followed the path of Chekhov who believed that the great stakes of modern drama must emerge from under the trivial course of the daily routine: "Let the things that happen on stage," he wrote, "be just as complex and yet just as simple as they are in life. For instance, people are having a meal at a table, just having a meal, but at the same time their happiness is being created, or their lives are being smashed up." But the playwright to whom she is bound to be compared in future, in power, style and intention, is Eugene O'Neill, for in the way it exhumes buried family secrets, exposes the symbiotic links among parents and children, and alternates between bitter recriminations and expressions of love, *'night, Mother* is a compressed, more economical version of *A Long Day's Journey into Night.*

I am invoking some great names in describing this play because I believe Norman, consciously or not, is writing in a great dramatic tradition, and, young as she is, has the potential to preserve and revitalize it. Nothing reinforces one's faith in the power and importance of the theater more than the emergence of an authentic universal playwright—not a woman playwright, not a regional playwright, not an ethnic playwright, but one who speaks to the concerns and experiences of all humankind. I have grown convinced that Marsha Norman is the genuine article—an American writer with the courage to look unflinchingly into the black holes from which we normally turn our faces. ☐

EXPLORING THE BACK ROADS

By DAVID G. WILCK

The reviewer is a staff writer for the *The Christian Science Monitor.*

Blue Highways. By William Least Heat Moon. Atlantic-Little, Brown. 326 pp.

BLUE HIGHWAYS by William Least Heat Moon—the journal-like record of a trip around, across, up and down America's lesser-traveled roads—is a tour de force. Its pages reveal two journeys. The first is personal. After the breakup of his marriage and a layoff from his college teaching position, Heat Moon drives away from his past in a van dubbed "Ghost Dancing" to explore "the three million miles of bent and narrow rural American two-lane," the byways marked by blue lines on old highway maps. "With a nearly desperate sense of isolation and a growing suspicion that I lived in an alien land," he writes, "I took to the open road in search of places where change did not mean ruin and where time and men and deeds connected."

His search succeeds, and his chronicle becomes a collective journey, in which the reader rediscovers through Heat Moon's fluid prose, drenched with imagery and metaphor, the American landscape—the glories of its history and geography, the variety of its people, their thoughts, their words.

The passage takes us in a grand circle around the United States, to towns like Nameless, Tennessee; Ninety-Six, South Carolina; Backoo, North Dakota. In such locales Heat Moon finds and celebrates the simple, profound and uncommon. A woman in tiny Dime Box, Texas, tells him: "City people don't think anything important happens in Dime Box. And usually it doesn't, unless you call conflict important. Or love or babies or dying."

In Conyers, Georgia, Heat Moon stays the night with Trappist monks. One of them, a former city policeman, tells him, "Coming here is following a call to be quiet. When I go quiet I stop hearing myself and start hearing the world outside me. Then I hear something very great." *Blue Highways* provides plenty of plain good old entertainment. Heat Moon has a penchant for humor and a zanier cast of characters has rarely been paraded before modern-day readers.

The book is also laced with historical details and background. Describing the kilometers of fences passing by, Heat Moon takes time to explain the beginnings of barbed wire and how it altered the face of the West. Stopping in Frenchman, Nevada—once a post on the Pony Express route—he digresses to tell of that famous mail service and its vital importance to the North in the Civil War. In Fredericksburg, Texas, he finds an Old West town with a hardware store that sells "graniteware pots to outfit a chuckwagon" and a Main Street wide enough to turn ox carts around. He writes: "People who think the past lives on in [restored towns such as] Sturbridge Village or Mystic Seaport haven't seen Fredericksburg. Things live on here in the only way

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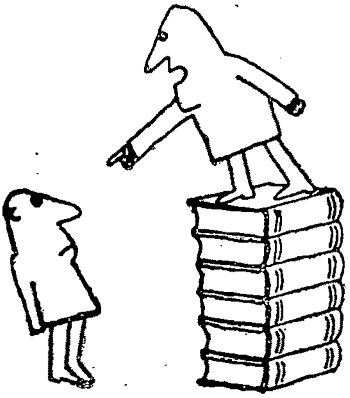
the past ever lives—by not dying."

Part Sioux himself, Heat Moon pays special attention to the plight of Native Americans and other ethnic groups. His visit to Selma, Alabama, scene of civil-rights marches led by Martin Luther King Jr., is poignant and unsettling. Have things changed? he asks. The answers vary, but dissatisfaction is a constant keynote. At the Navajo reservation in northern Arizona, he records decline and despair. Later, a young Hopi studying medicine in Cedar City, Utah, says: "...We all have to choose either the new ways or the Hopi way...A lot of us try to find the best in both places. We've always learned from other people. If we hadn't, we'd be extinct like some other tribes."

Nearing the end of his journey, Heat Moon draws out his wanderings on a map—"a blue circle gone beyond itself." Describing his feelings about his thousands of kilometers of back-road travel, he writes, "...Passage through space and time becomes only a metaphor of movement through the interior of being." ☐



WOMEN AND THEIR WORK

By LESLIE TENTLER

The reviewer is associate professor of history at the University of Michigan and author of *Wage Earning Women.*

An Economic History of Women in America: Women's Work, The Sexual Division of Labor, and The Development of Capitalism.
By Julie A. Matthaei. Schocken Books. 381 pp.

Out to Work: A History of Wage-Earning Women in the United States.
By Alice Kessler-Harris. Oxford University Press. 400 pp.

IN recent months a spate of articles has appeared in the United States concerning the growing doubts of some women that paid work is a sure source of fulfillment or that it is easily integrated into women's lives. Work outside the home, these women argue, is an overrated activity, and often creates more problems than it solves, especially for mothers of young children. Are such women harbingers of an era when large numbers of women will choose to work only intermittently in adulthood, subordinating work ambitions to the pursuit of stable family lives? Will young women eventually reject the career-centered lives of their older sisters, much as today's undergraduates seem to have rejected the political activism of an older generation of college

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students? Both Alice Kessler-Harris and Julie Matthaei say no.

They argue that the rapid movement of wives and mothers into the labor force over the past 20 years is the product, not of feminism, but of historical and irreversible forces that date from the 19th century. For good or ill, the changes in family life and relations between the sexes—changes linked in the popular as well as the academic mind to women's employment—are here to stay. American women have always earned low wages, always had limited job opportunities, always been defined as socially different from men. But, ironically, sex-segregated work has fostered experiences and opportunities for women that have undermined the sexual division of labor, not only in the work force but in the family as well. How this has happened—more precisely, how each author thinks it happened—is the subject of these two very good books.

Both authors open with a fairly brief survey of colonial women's work—work which, although clearly essential, was not accorded the same status as men's work, making women socially inferior beings. Matthaei makes the more extreme argument, devaluing women's work more, I suspect, than many 18th-century men would have done. Women, she says, were perceived as "natural, animal-like" creatures whose only work was often-crude production for household use, and whose chidbearing was seen not as the first step in an honored career as mother but simply as a "biological activity."

She sees industrialization as the force behind the rise of an affectionate style of family life, one centered about a wife whose principal duty was protective nurturing of the young. And she wants to locate the birth of this affectionate family in the early 19th century. Her neat model, however, simply doesn't work; too many facts of colonial life contest it. Long before there were factories, there were women and men able to cherish their children and live affectionately as husbands and wives. The popularity in recent years of arguments like Matthaei's suggests that as historians have found it increasingly difficult to chart inevitable progress in the political sphere, they have turned to the private arena of the family to demonstrate that, emotionally at least, our world represents progress over that of our ancestors.

It is when they come to consider the Victorian family that the two authors differ substantially. Both agree that in the 19th century a growing number of Americans articulated and subscribed to a highly romantic view of family and femininity, a view that placed a self-effacing mother at the heart of a home that specialized in love and service to its members rather than production of goods. But they disagree about the meaning of this role for women. Kessler-Harris sees it as a radically limiting one, frustrating the aspirations of young women who in the early 19th century were ready to move outside the family to seek personal independence through employment.

Matthaei, on the other hand, argues that this "ideology of domesticity" was liberating, for it enhanced the status of women and gave them a sphere—the home—where they might have authority and create an independent identity. Men and women, in her view, were redefined by 19th-century culture as "separate but equal" social beings, and much of what has happened to women in our century has occurred because women, accepting their equality, have steadily expanded the sphere of "home"—into politics and professional life—until there is little to separate man's world from women's place.

Kessler-Harris, while acknowledging both the comfort and authority women might derive from a celebration of domesticity, maintains that women have accomplished change in their lives only by ignoring or battling against the prescriptions bequeathed them by the 19th century. And, in her view, the work experience has provided considerable ammunition with which to do battle against the claims of home.

Because they differ on this important issue, the authors pursue different strategies in the central chapters of their books. Matthaei discusses women's domestic work in great detail; Kessler-Harris has little to say about housework but much to say about a variety of paid occupations in the 19th and 20th centuries. Matthaei sees the typical woman worker as a consciously temporary worker, earning wages to help her family, preferring undemanding jobs with female coworkers to competition with men for high wages and jobs where promotions are possible. (These attitudes, she argues, are especially characteristic of women before World War II, but affect many women even today.) Kessler-Harris, by contrast, emphasizes the militancy of wage earners in the 19th and early 20th centuries, arguing that many women joined unions and went on strike to improve their lot. Women, of course, have always joined unions in relatively smaller numbers than men, and the vast majority of working women in U.S. history never went on strike. Still, Kessler-Harris would argue, given a powerful social prohibition on female aggressiveness, given the strong inducements for women in the past to regard their work as casual and temporary, even a small minority of female trade unionists is a significant social fact.

Once into the 20th century, the authors are in substantial agreement. Both see the 1920s—a time of rising real wages and increased social freedom for the young—as a critical time in the development of a new female identity. Young, educated women especially began to show signs of ambition at work, to want more from the job than subsistence and a useful means of passing time until marriage. Many began to ask why they must surrender their career ambitions when they married. According to both authors, this slow revolution in female identity continued during the Depression, despite considerable public hostility in those years to married women who worked. During the Depression and the war years that followed, large numbers of women learned that their family obligations necessarily included wage earning, and many families survived only because wives and daughters were willing and able to work outside the home. The increasing numbers of married women who went to work in the '50s and '60s, then, were simply, extending the logic of their mothers' lives. They went to work because their families aspired to a standard of living a single breadwinner could not provide, because they enjoyed their jobs, because married women's work had begun to undermine the prestige of the nonemployed homemaker.

Thus the social change that disturbs the world today has deep roots. It will not easily be reversed. And both authors are clearly pleased with this conclusion. Matthaei is even willing to argue that the inevitable rise of truly egalitarian marriage may well lead to a more equitable and less violent society.

And yet it is hard, without the eyes of faith, to ignore the burdens that recent social change has placed on women. For some women, it is true, the loosening of family bonds has meant a welcome freedom: interesting careers, companionable marriages, the ability to survive on one's own if necessary. But for many others, the loosening of family bonds has created a new set of psychological burdens to replace—or augment—an older and by now familiar set of grievances. And for some women, the loosening of family bonds means poverty. Moreover, the anxieties bred by social change have meant a politics of confusion and resentment, the domestic fruits of which, ironically, are bitterest for poor women and their children. □

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STORY OF A PROFESSION

By H. JACK GEIGER

The reviewer is a physician who teaches community medicine at the City University of New York

The Social Transformation of American Medicine: By Paul Starr. Basic Books. 514 pp.

HEADLINES call attention to artificial hearts, transplanted livers, genemanipulating drugs that edit out lethal errors in the hereditary codes inside cells. Other headlines speak of numbers: Americans spent $247 thousand million on health care in 1981—almost 10 percent of the gross national product and 15 percent more than in 1980. Technology and money are central concerns in U.S. medicine.

Yet we know—and national debates reflect the knowledge—that there is more to medicine and medical care. The U.S. national health care system is a part of a culture, a history, a political and economic order. It embodies a basic social commitment to the care of the sick, the weak and the helpless. It speaks to issues of justice and equity and human rights. It expresses belief in the power of science and attitude toward physicians. It is the product of a century of political struggle.

Paul Starr's book *The Social Transformation of American Medicine* is a brilliant blend of sociological, political,

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economic and cultural analysis covering two centuries of American experience. Starr, a young Harvard sociologist, has written the definitive social history of the medical profession in America.

He traces the roots of the contemporary health care system to a changing culture and a shifting economy and makes its growth and development clear and comprehensible. This is a monumental achievement. Additionally, he has written a book that is laced with wit and irony and graced with style. For all its scholarship, it is intensely readable—and intensely relevant.

Everyone who wants to understand what is happening to U.S. medical care should read the second half of Starr's book for its lucid accounts of the major health care reforms, of the problems and developments of the last four decades: the rise of third-party health insurance and employee health benefits, the political struggle to create publicly funded programs for the elderly and the poor, the effort to establish regulatory control over runaway expansion of the hospital system, burgeoning technology and frightening costs. Then everyone should turn back to the first half of the book, in order to understand the social processes, the economics and the politics that got America here.

That history, Starr argues, is dominated by two long and powerful movements: the rise of professional sovereignty and the transformation of medicine into "an industry run increasingly by corporations and the state in as yet unsettled relations with the medical profession." Within that framework, Starr answers some difficult questions.

How did physicians, who made up "a weak traditional profession of minor economic significance" that was bitterly divided and financially insecure in the 19th century, become a united and prosperous group in the 20th? Doctors exploited progressive belief in science over populist support of self-reliance, thus creating cultural authority for medicine. Having increased demand, they then controlled supply—by ending sectarian quarrels within medicine, restricting entry to the profession through licensing laws and limited admissions to recently reformed medical schools, and establishing their authority over medication.

Why did hospitals become the central institutions in American medical care during the early 20th century? The proliferation of nonprofit community hospitals, which focused on surgery and acute care and were dependent on patients' payments rather than government support, gave doctors crucial leverage. Only doctors could order the admissions that filled the beds—and use the hospital as a highly profitable second office to generate fees.

How did physicians escape from the control of the corporation? They boycotted businesses and insurance companies that hired doctors to provide direct medical services and, forced them to retreat into insuring against the costs—on the physicians' own terms. They resisted prepaid group practice until such groups triumphed in the courts through application of antitrust laws. And they argued successfully that it was unethical for anyone except doctors to make a profit from personal medical services.

The result was the irrational, frag-

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mented, disorganized complex of hospitals, private medical practices, limited public health facilities and third-party insurers that exists today. "But even disorganization," Starr observes, "is sometimes systematic." There was method in the muddle. No single, powerful, coordinating authority would be allowed to emerge, because it might threaten professional autonomy and control of the medical market. But increasingly over the last decade, he notes, physicians are "witnessing and indeed taking part in the creation of corporate health care systems." The reasons are multiple. Chief among them, Starr notes, is the loss of monopoly power because of the rapid rise in the supply of physicians. There were 565 Americans for every physician in 1975; by 1990, there will be only 404—a 30 percent decrease—and there will be nearly 600,000 physicians in practice. The likely result will be increasing disunity and professional conflict.

At the same time, the federal government (which already pays 42 percent of the nation's health care bill) and big business (which now spends $55 thousand million annually for ever more expensive employee health benefits and other medical costs) will be intensifying their search for alternatives. Finally, the hospital industry itself is becoming concentrated. One-third of all the hospitals in the United States, nonprofit and profit-making alike, are now part of multi-hospital chains or multi-institutional systems. Control is shifting from local institutions to regional or even national headquarters. The stage is set, Starr believes, for a turbulent decade of conflict—among physicians, between physicians and hospitals, between medical care providers and insurers, between all of them and government.

The only flaw in this book is its restricted focus. Starr limits "medicine" to mean personal medical services and public health. His book, in consequence, is a history of medical care, not a history of health and disease in a political system that determines to considerable degree who will suffer and who will be spared.

But, given the sweep and breadth of Starr's work, this is a relatively minor cavil. *The Social Transformation of American Medicine* should become the reference standard for everyone's understanding of medical care, the sourcebook for debate over social commitments to the ill and a guide to the humane system we may yet create. Though history may provide no certain answers, it tells us how many choices we have had—and still do. ☐